

SMALL BUSINESS AND ENTREPRENEURSHIP IN NORTHERN FINLAND

*Tom Donnelly & David Morris,
Coventry University
Martti Hyry,
University of Oulu*



CONTACT: Professor Tom Donnelly, Faculty of Business, Environment and Society, Coventry University, Priory St, Coventry CV1 5FB, UK. Tel: +44 (0) 2476 888418, Fax: +44 (0)2476, 888400, Email: t.donnelly@coventry.ac.uk

ABSTRACT

High tech industries, small and medium sized enterprises and Nokia are almost synonymous with Northern Finland in that the past twenty five years have witnessed significant structural, economic and social changes in Finland's northernmost provinces of Ostrobothnia and Lapland. The traditional economy of the region was based on agriculture, forest based industries such as timber and paper and the exploitation of small mineral deposits. In the 1950s and 1960s it was evident that these were insufficient to sustain future economic growth as both provinces suffered from serious economic and social deprivation and outwards migration. Governmental responses to these problems were to tackle the basic infrastructural problems that existed, including the founding of a university in Oulu and later one in Rovaniemi. It was also clear that future growth would depend upon industries, based on 'knowledge,' rather than natural resources and so attempts were made to bring about a paradigm shift in the North's economic structure. This was effected jointly between the government, the local authorities, higher education and research institutions and local entrepreneurs. The aim of this paper is to explore how the economy was transformed through looking at the interplay between government, institutions and the entrepreneurs.

INTRODUCTION

A recent report on global competitiveness indicated that Finland was the most competitive economy in the world, ahead of the United States, Sweden Denmark, Taiwan and Singapore (World Economic Forum, 2005). Much of the country's economic success has been based on its High Tech industries, especially telecommunications, biotechnology, health, media and environmental sectors. However, it needs to be remembered that High Tech has also been applied to traditional industries such as paper, making Finland's forest management, paper and pulp industries some of the most efficient in the world.

Though large in geographical terms, Finland's population is only 5.2 million strong with most of that concentrated in the southern provinces in cities such as Helsinki, Tampere and Turku. The focus here though will concentrate primarily on the two northern provinces of Lapland and Ostrobothnia, but with a specific emphasis on the Oulu region in Northern Ostrobothnia because it is from here that most of the drive for economic change emanated from the 1960s onwards, and the city still acts as the fulcrum around which much of the North's economy centres.

Founded in 1605, Oulu is situated some 200 kilometers below the Arctic circle and nearly 600 kilometers north of Helsinki and for nearly four centuries has functioned as a regional capital and commercial entrepot for both Ostrobothnia and Lapland. Together the two provinces cover nearly 50 per cent of Finland's land mass, but population density is low, being only 7.2 per square kilometer in Ostrobothnia and 2.2 in Lapland compared with a national average of 14.2 (Look Oulu 2004).

In investigating recent economic change and development in the Northern provinces, the emphasis in the paper needs to be tripartite in that the role of SMEs cannot be separated out easily from that played by national and regional institutions, including the universities, polytechnics and specialist research institutes, and also from the part played by Nokia from the 1990s onwards. Initially, there will be discussion of the genesis of economic change in the region and of the initiatives taken by both the national and regional authorities, the University of Oulu as well as of the formation of an infrastructure within which entrepreneurs could flourish. Implicit in what has been said is that there appears to have been a near consensual approach to changing the economic structure of the region. Indeed, as Ornston and Rehn have argued, Finland's economy has long been imbued with a spirit of corporatism, which may have been a factor in facilitating the high degree of cooperation between institutions and business (Ornston and Rehn, 2004). Indeed, this interpretation can be substantiated indirectly by the relevance of Ezkowitz's Triple Helix theory in examining events in Oulu which reflect a high degree of interdependency between institutions and entrepreneurs.

Recent growth and development should be seen in three stages. The first stage occurred between 1970 and 1990 when the emphasis lay in creating small businesses predicated on new electronics based technologies with the founding of the first science park in Finland in 1982 to encourage this. The second began in the 1990s when development focussed on four key technologies: information and communication technology, (ICT) opto-electronic measurement technology, biotechnical and medical technologies. The current stage reflects the moves to meet the challenges of digital technologies.

Background Literature

Approaches to regional economic growth in recent years have spanned across a range of disciplines and fields. Among these have been traditional approaches in economics, cluster theory, path dependency, the growth of knowledge industries, networking and the role of learning organisations. (Gertler and Wolfe 2002) In explaining the relationships affecting growth and development several statistical techniques have been utilised including the application of location quotients, growth share matrices, cluster mapping and factor analysis (ICF Consulting, 2000, Bergman and Feser 1999). Such methods yield valuable information and insights, but of themselves do not explain many of the dynamic features found in clusters or concentrations at different stages of their growth nor do they sufficiently explain the trajectories of individual firms or specific groups within clusters. (Breschi and Malerba, 2001) An alternative approach is that of the case study as espoused by Yin (Yin, 1994). Pioneering in this work is Saxenian's study of Silicon Valley and Route 128 (Saxenian 1994) and in turn, this has been followed by others who have analysed the longitudinal trajectory of Silicon Valley, its operational features and institutional underpinnings (Kenny, 2000; Lee 2000) Essentially, case studies permit detailed analysis of local and internal growth factors, governmental, regional and municipal policies, institutional

support, labour supply and local industrial structures and systems. All of these are important in exploring and developing an understanding of path dependencies, knowledge diffusion and learning through networking systems as well as issues of generalisability (Saxenian, 1994; Lee, 2000). Finally, because of deficiencies in Finnish regional data in that long run data are not fully available yet, the study will be that of a qualitative case.

THE ECONOMY OF NORTHERN FINLAND

There is little doubt that Northern Finland has enjoyed significant economic development in recent decades through what became known as the “Oulu Phenomenon”, but this can only be understood in the context of the wider changes that have taken place to transform the region. In the nineteenth century, Oulu’s economy depended mainly on exporting tar which had been produced in the forest areas before being transported down Finland’s east-west flowing elongated river systems to the deep water port at Oulu for export. The emergence of steel hulled ships ended the trade in tar and the economy was thrown back on agriculture and timber industries with the latter moving into pulp and paper production. The North suffered badly during the Second World War with large parts of Oulu, for example, being destroyed due to aerial bombardment. Following hostilities, a reconstruction programme was enacted with the building of the Merikoski paper mill in the city and by the exploitation of small mineral reserves in the region, especially around Raahe some 70 kilometres south of Oulu.

In the following decade the Finnish government, like other European governments of the day, became increasingly aware of serious regional inequalities. The North lagged significantly behind the south, particularly in terms of the outwards migration of young people in search of employment or higher education in the Helsinki region. Moreover, educational and medical standards, too, suffered badly in comparison with the south. In an attempt to improve the situation the national government had to adopt an active rather than a passive policy in both education and medicine and to expand services generally throughout the northern regions to try to create jobs, improve living standards, arrest the rate of rural depopulation and raise the quality of life. (Oksman, 2002; Tunkelo, 1988)

The role of higher education in regional economic development has attracted a great deal of literature in recent years. Not only do universities and polytechnics attract students and visitors, they offer direct and indirect employment in their local economies and so generate income and expenditure. Moreover, because of their role they are often able to interact with national/regional/local authorities and industry through research and course provision and, also, enact government policy to meet specific objectives. In sum positive direct and indirect contributions can be made in regenerating areas and regions through the development of intellectual capital and new skills (Batterbury and Hill. 2003). Such a role was recognised in Finland.

The decentralisation of higher education from Helsinki then became an arm in overall regional policy in Finland. In the 1950s two committees, the Myrberg and Kaitera Committees both recommended that a teacher training college, a university and a medical school be founded in the north and that these should be located in Oulu, the largest northern city. Oulu University opened its doors in 1958 with a specific regional mission. It was charged with providing teacher training, the highest level of scientific and technical education and to carry out research in fields

that were vital to the North's economy (Salo, 1998). Clearly, this was a highly utilitarian view of the role of a university in a regional economy. Crucial to this was the development of the Faculty of Technology which by 1966 enjoyed a Department of Mechanical and Electrical Engineering, led by Professor Juhanni Oksman.. Initially, the Department concentrated its efforts on hydro-electric power projects as the rivers of Northern Finland were harnessed to provide much needed electricity (Salo, 1998).

Oksman's Department proved to be the cradle of the 'Oulu Phenomenon' because it was from there that events were to unfold. It was under his guidance that an electronics industry emerged. From the late 1960s he began to direct teaching and research development away from electric power generation towards electronics and appointed Professor Matti Ojala to reinforce this. Both men were aware that the region could no longer develop on the basis of its narrow and somewhat precarious natural resource base and that the future lay in a paradigm shift to a diversified economic structure through the generation of employment in modern industries that were based on intellectual capital and skills. They envisaged that electronics in its broadest sense could sustain up to 12,000 jobs in Northern Finland (which is more or less the total at the time of writing) especially as northern labour was much cheaper to employ than southern ((Oksman, 2002) As part of the university's original remit, a medical school was opened in 1959 and, although it was probably not considered as a generator of research at the time, this, too, has proved decisive in developing both the health and biotechnology clusters in the region from the mid 1990s onwards (Salo, 1998).

The founding of a university in itself was an insufficient cause of regenerating the northern economy and so this has to be seen within the wider role played by government at national and regional levels. In line with other European countries in the late 1960s, Finnish regional policy became more interventionist as the scale of the problems in the north became increasingly apparent. Government initiated Regional Spatial Planning Councils, which included politicians, academics, businessmen and trade unionists, were set up in the various problem areas, including Ostrbothnia and Lapland. In the beginning this exercise was highly centralised and dominated by Helsinki, but it soon became clear that local input would be vital in that the regional and local authorities would have important role of play in policy development and implementation.

Lapland was considered the more serious problem area due to its scattered economy and high incidence of economic and social deprivation to say nothing of the rate of depopulation. Indeed, between 1965 and 1970, Lapland's population fell from 310,000 to 300,000 despite natality rates being higher than mortality rates. Lapland was then viewed as the most needy candidate for economic assistance and so government policy focussed on infrastructural improvements such as schools, roads, transport, communications and hospitals. Finally, in 1975, as a counterpart to Oulu, the government launched the University of Lapland at Rovaniemi.

Returning to Oksman and Ojala's vision, an electronics industry was perceived almost as a panacea for tackling the North's grave unemployment problems, especially as the traditional industries were experiencing very modest levels of growth. It soon became clear, however, that Lapland lacked the necessary academic infrastructure to engender and sustain such a new venture. A series of seminars analysing the employment situation also revealed surprisingly that it was primarily women who were unemployed because of the lack of job opportunities. Many

males could still obtain work in agriculture and forest related industries that called for heavy manual labour. A modern electronics industry was different in that, regardless of gender, the prime requirement was highly educated people with university degrees or high level professional qualifications. The focus of attention then moved southwards from Lapland to Ostrobothnia and Oulu University. (Oksman, 2002; Ahokangas and Ransanen. 1998)

A key and very much related factor in the restructuring of the local economy, particularly in the encouragement of entrepreneurship, was the coming of VTT, the national electronics and development agency to Oulu in 1972 and its attachment to the university. At that time VTT was funded by SITRA, the Finnish National Fund for Research and Development, and also by TEKES, the Finnish National Technology Agency. The important point here was that the advent of VTT to Oulu was largely due to continuous lobbying of the national authorities in Helsinki by the university's Vice Chancellor, Professor Mannerkoski and Oksman and Ojala. In the early 1970s the university really had extremely little to offer by way of either basic or applied research into electronics, but nevertheless, the arrival of VTT is considered as a catalyst in that research in both the public and private sectors was encouraged with funding for projects that had been properly planned and vetted. By 2004 VTT employed 300 people in Oulu (Marjomaa, 1992-2005; Salo 1998; VTT, 2004). Essentially, by the late 1970s the institutional structures to facilitate the development of a 'new economy' were in place.

THE OULU PHENOMENON

As discussed above, in the 1970s discussions took place between the national, regional and local authorities with both businessmen and the university on how the economy could be diversified. Eventually in 1978 the Spatial Planning Council, having looked at experiences elsewhere such as Cambridge in the UK and Sophia Antipolis in France, decided upon creating 'a Silicon Valley of the North.' The vehicle chosen to effect this was a Technology Park, named Technopolis (Oulun Technologiakyla Oy), which was set up at Linanmaa almost adjacent to both the University and VTT. The partners in this venture were Oulu City Council, the University, Kera (The Regional Development Authority) and 18 small to medium sized firms drawn from the area. In essence this represents a clear example of the Triple Helix at work.

The role of technology parks in general has attracted a considerable amount of attention in recent years, but they cannot be defined in simple terms. Some are simply property based companies with links to universities and research institutes, while others are vehicles intent on furthering knowledge based industries and exercise a management function to facilitate knowledge transfers from basic research to commercial applications. (Yli-Renko and Autio, 1999) In the Finnish context Technopolis straddles both definitions. Regardless of differing views on the role of technology parks, it tends to be knowledge based or related industries that dominate them. In effect they have been described as "technology villages" offering a framework across a country or even internationally that brings together technology and corporate incubators that can in time lead to industrial centres being concentrated round universities, research institutes or very large firms, which help to drive progress on the park (Inguen, 2001) This view fits in with much of the literature on clusters even though these differ in structure and function (regional, industrial, sectoral or technological) and points to the growth of networks, learning and innovative communities, sharing similar mental and cultural features which are often cemented

in friendships and shared experiences, cultivated over longish periods in a specific setting. Such groupings though are subject to change through entries and exits which are often reflective of changing technologies and economic circumstances. Moreover, firms operating on parks often both cooperate and compete due to economic necessity even in different parts of the value chain (Lovio, 1993). Such is the case at Technopolis where many firms act currently as partners and subcontractors to Nokia and with each other.

The foundation of Technopolis was regarded as risky as all of the small incubating units were designed for easy conversion to houses if the venture failed. This did not happen and in the course of the next 8 years 45 firms took up residence. In the early 1990s the Finnish economy suffered a deep recession due mainly to the collapse of its main export market, the Soviet Union. Once the downswing ended the progression of new firms continued in Ostrobothnia and by 2003 there were over 200 firms at Linanmaa alone, working on ICT, optoelectronics and software engineering (Paloniemi 1991, Technopolis, 1983-2004). The very success of Technopolis led to its replication on two fronts. Ten years later in 1992 in an effort to boost medical related technologies a second Park, called Medipolis, was spun off and situated close by. The intention behind this was similar to that of Technopolis: namely the provision of high standard premises, including laboratories, for new small firms which could avail themselves of the expertise available through the university and its adjacent hospital. Indeed, this did happen through staff interchanges with the university's doctoral and post-doctoral researchers working in firms at Medipolis (Simila, 2002). By 2000 60 firms were involved, but unfortunately, Medipolis failed to yield a profit and in 2002 was merged with Technopolis.

On a broader front the 'Polis' concept was replicated elsewhere but on a much smaller scale in Northern Finland at more distant locations such as Pudasjarvi, Ii, Haukipudas, Kemi and Ykliminki as part of an overall regional attempt both to sustain communities and to engender new industries within them. In all thirteen 'Polis' have been created in the North and all of them are within reach of either Oulu or Rovaniemi Universities or neighbouring polytechnics.. Indeed the concept has spread to Sweden and is part of the cornerstone of the Bothnian Arc Association, a common interest body, involving the small municipalities and SMEs on the coast of the Gulf of Bothnia whose objective is to develop their immediate economies and to increase their trading links into the Barents Area of North Norway and Russia as far as Archangel and Murmansk (Donnelly, Morris and Hyry 2005). Finally, In 1984 Oulu declared itself a 'City of Technology' and used this image to promote itself in attempts to attract new business. Overall this has been successful and within a short time articles were being written on the 'Oulu Phenomenon' with the city being depicted as the 'Light of the North' (Tunkelo, 1988).

Clusters and Consolidation

The decade of the 1990s were essentially a decade of growth and consolidation as the ICT and other clusters gradually emerged, but the question arises on exactly who were the entrepreneurs involved? As suggested, by far the majority of firms founded could be described as New Technology Based Firms (NTBF). Such firms are often quite specific and set up by technologically educated personnel between the ages of 30 and 40 years after 10 to 15 years experience in a certain speciality. Many of these founding entrepreneurs may be drawn from a unique area, have built up friendships with others of their ilk through attending the same schools, universities or other

establishments and share either a common culture or set of beliefs. The early start up capital required varies across sectors. For example, software firms are cheaper to fund than those in the biotechnology sciences. Moreover, as American experience has shown, many such firms are located close to universities where specialist support can be obtained (Breschi and Malerba, 2001; Wolfe and Gertler, 2003) Often NTBFs focus on product rather than process development and often expand their business through reinvested profits or in some cases by acquisition. As mentioned earlier, on the one hand, external relations are important through either linkages with institutions or their clientele, but, on the other hand, over-dependency on a narrow range of clients either as customers or suppliers may have a stultifying effect on growth and development, leading to long term vulnerability (McCoughlin, 1998)

Reverting to the situation in Northern Finland, it is worth recapitulating that the geographical, cultural and intellectual milieu in which these NTBFs emerged was geographically remote. New growth though demanded well educated, innovative people who could work in teams, network and exchange knowledge. Fundamental to these concepts is that this type of development is not essentially about structures, it requires a specific culture or mental state that can often be self reinforcing. (McCloughlin, 1998). With some exceptions almost all of the founding entrepreneurs hailed from Northern Finland with Lutheranism being the common linking religious and cultural background. Over 90 % of Northern Finns would describe themselves as Lutheran and also display a strong sense of loyalty to their district and region. Moreover, it has been estimated that between 1982 and 1992 just over 50% of new entrepreneurs were graduates of Oulu University's Faculty of Engineering. Since then Oulu Polytechnic, too, has contributed its fair share of entrepreneurs. (Paloniemi, 1991; Oulu Business Review, 2002) Furthermore, there have been a number of spin-offs from the University and VTT. Ten, for example, have come from the University's Biotechnology Research Centre (Infotech Report, 2002; Biocentre Report, 2002).

Space precludes discussion of the origins and development of all firms so selected examples must suffice. Most firms were initially self funded and consisted of only a few employees. Electrobitt Oy, for example, formed in 1985 by Juha Hulkko, an Oulu University graduate, and further growth came from retained earnings. An outstanding example of a new firm emerging is Polar Elektro Oy. This concern was established in 1977 by Seppo Saynajakangas, Professor of Electronic at Oulu University. His speciality lay in the development of heart rate monitors that could be used to measure the heart rate performance of athletes and has since been extended to monitor patients with cardiac problems. While working at the university he set up his own business close to Oulu airport and this has developed into a world leader in cardiac monitoring with its products being sold extensively in Europe and America. (Polar Electric, 2002) A further example is that of Lauri Kuokkanen, who has been involved in six firms. Kuokkanen worked with Nokia in Helsinki in the 1960s and moved to Oulu in 1972 where he worked in Nokia's newly established communications factory. After quitting Nokia in 1976 he established his own firm, Insele Oy, which produced electro mechanical components. Two years later he established a second firm, Lauri Kuokkanen Oy, to develop duplex filters for telephones. To meet rising demand a branch plant was opened in Kempele 20 kilometers south of Oulu. When NMT technology emerged in the Nordic countries, Lauri Kuokkanen Oy became such an important supplier of strategic components to Nokia that the latter bought out the firm in 1985. Kuokkanen then went on to establish a third firm, Solitra Oy which also produced filters for telephones, but 7 years later sold this to Rautarukki, a Raahe

based steel works. When selling Solitra Oy, Kuokkanen retained the radio modem production facility and from this established a fourth firm, Ultracom Oy, to develop radio transmission devices and then opened a fifth concern, Ultraprint to produce printed circuits before selling this on in 2000. Finally, a sixth firm, Ultracrea, was formed to develop radio antennae. In total Kuokkanen created around 1,500 new jobs in the Oulu region within the space of twenty or so years (Hulton, 2004; Ultracrea 2004; Nokia 1995).

Entrepreneurs Education and Training

As discussed earlier, by far the great majority of entrepreneurs came from graduate backgrounds in engineering. It soon became apparent that many of them were singularly lacking in business acumen and needed to take courses in business administration and kindred areas to overcome this. Fundamental to this were attempts to create a forum in which experiences and best practices could be shared. Key to this was the setting up in the 1980s of a new body, Revontulirhmma (The Northern Light Association) whose aim was to create new initiatives in business and management education. The group comprised of entrepreneurs, regional and municipal leaders and academics and convened at the University. It was from this that the University developed an Executive MBA specifically aimed at people in the NTBFs. The first programme began in 1989-1990 and has been run on a two year basis ever since. The second EMBA began in 1991 and one of the participants on the course was the Director for Business Affairs in Oulu city, Paavo Simila. This experience offered him new insights into the development of economic and business strategies. Influenced by discussions with fellow students, he started a new type of development process on local business development in that the university and 40 businessmen, mainly from SMEs, were invited to formally participate in determining the next stage in Oulu's development strategy. The outcome was "*The Business Development Strategy of the Oulu Region*" which was accepted by the City council in 1993. This process continues to function, but in a modified form and represents a good example of public-private cooperation (Simila, 2002-4)

The MBA and other programmes offered by the University, including the Business Excellence Programmes were not simply of an academic nature, but drew heavily on experiential learning and involved trips overseas. Students have gone to several universities in the UK the USA and China. Additionally, business and management courses are now offered on undergraduate engineering courses at the University and Oulu Polytechnic. Besides formal education the University in fulfilling part of its regional research mission attempts to monitor the economic health of the region. Important to this was the launching of the Oulu Business Review, edited by the Centre for Innovation and Learning, which, acting as an economic and business observatory, audits firms, economic trends and publishes relevant articles. Finally, as will be discussed later, the University is an active participant in research with both large and small firms.

The practical side of business and management training cannot be ignored and this was very much the view of the Finish government when it launched its centre of Expertise Programme in 1994 to encourage developments in new technologies and improve the quality of entrepreneurship. Eighteen bids were submitted for funding and Oulu's was rated the best. Under this initiative several projects were undertaken across the region under the title of Pro-Electronica, which was controlled by a Board of Directors which included the Rector of the University, the Director of Technopolis and the Director of the Regional Council. Overall between 1994 and 2000 the programmes received nearly 65 million Finnmarkka in government funding. Technopolis played a central role in this

through organising staff training events and seminars. A new training facility, Pohto, was built and was helped considerably by drawing on expertise from Scotland. It is considered by Kess that these programmes were vital in the emergence of Centres for Wireless Communication (CWC) and the Centre for Wellness Technology which involved the nascent bio and medical technologies (Kess.2003). Basically, the project offered a very fast route in management training when the related electronics and ICT technologies were moving very quickly in the 1990s and it was no surprise when it was revived again in 2002 to build on earlier success.

Nokia in Oulu

Though it began life as a timber company, Nokia is now one of the world's leading companies in the field of telecommunications. It is not the intention here to consider all of Nokia's activities, but rather to focus on its role in Oulu, especially from the 1990s onwards because of its relationship with the area's SMEs. In the 1960s Nokia operated a small cable making plant in Oulu, but the decisive long term influence was its decision to open a second factory there in 1972 where it produced small quantities of American military radios and communications devices under licence for Finland's armed force. The reasons for coming to Oulu were twofold: there was a major army barracks outside Oulu which housed Finland's Northern Command and, also, Oulu was attractive as a production point due its slack labour market and low wages (Hannula, 2002, Wikstedt, 1999).

Nokia's role in the Finnish national economy is immense, accounting for circa 4 % of GDP, 40 % of all ICT sales and for approximately 25% of all Finnish export growth in 2000, giving the company an extremely important and influential position. Until the mid 1980s, however, Nokia's activities were not strongly aligned either to Oulu's emerging industries or its university. The rise of telecommunications, based on micro processing technologies, however, forced change. Nokia's subsequent development in the area was due initially to its acquisition of several local medium sized firms, and it was from then onwards that it began to become more involved with a wide range of NTBFs. (Haikio, 2001). The cable business was Nokia's most profitable business until the early 1990s, but it had also acted as an incubator for the emerging electronics division in the 1980s when Nokia diversified into consumer electronics, information technology, mobile phones and telecommunication networks with the latter two becoming dominant.

In the late 1970s Nokia began gradually to manufacture base stations for mobile telephone systems in Oulu and also produced other devices such as 'beepers' for contacting people via tele networks. The key to understanding Nokia's growth and importance rests on its growing international role through its participation in the Nordic telecommunications cellular networks and subsequently in the development of European standards for digital phone systems where it cooperated with Alcatel of France and Germany's AEG. As demand for mobile phones grew, Oulu became primarily a research centre for product development involving digital software, integrated circuits and digital signal processing with the latter being closely linked to research at the university, the polytechnic and VTT. Overall Nokia's work force rose to nearly 5,000 in Oulu, but has since fallen back and stabilised at circa 4,000. Finally, Nokia participates in the OBSAI (Open Space Station Architecture Initiative) project with LG Electronics, Hyundai and ZTE (a Chinese firm) which has led to the participation of several of Nokia's Oulu suppliers and partners in aspects of this development.

It is abundantly clear that with a such an international role and such a large work force Nokia plays a highly important role in the economy of Northern Finland.. This, however, needs to be seen within the context of the local SMEs. In the late 1980s Nokia used local firms as subcontractors to stabilise its manufacturing capacity in both base stations and to a lesser degree mobile phones. Inter-firms linkages were weak and Nokia kept its subcontractors very much at arm's length and there was little cooperation between them. In the following decade matters changed due to the growing volume of business in mobile phones. Outsourcing was recognised as an alternative to internal manufacturing and the relationship between Nokia and many SMEs evolved in a different direction. (Vilmi, 2001 Kuivalainen, 2003). Much of the change in Nokia's behaviour towards the SME's was necessitated by the imperative of managing fast growth and strengthening its supply chain network. Moreover, over time rather than being based solely on price tendering, subcontracting became systematic, gradually evolving into long term subcontracting and eventually into partnerships. Increasingly, responsibility for module development and R&D was subcontracted out in classic fashion to firms which had sufficient intellectual and research capacity. This entailed both the sharing of risks and rewards. Scanfil Oy and Electrobit Oy are outstanding examples of how firms deepened their relationships with Nokia. Established in 1976, Scanfil Oy began to act as a component subcontractor in the 1980s when Nokia Networks became an important client. In 1990 Scanfil became an official partner of Nokia. Five years later it was described as a system supplier and today is a full manufacturing partner to the extent that by 2002, Nokia's business represented two thirds of Scanfil's turnover. (Takenen,2002) The case is similar with Electrobit Oy which became a significant partner in Nokia's R&D programmes in base stations. Currently, Nokia and Electrobit finance joint research programmes in software engineering development in Oulu University. So important are such partnerships that Nokia has transferred employees to key SME partners to supplement their skills. For example, 60 Nokia employees in software engineering were transferred to another local firm, Tietenator, to participate in a joint research exercise. Although credit must be given to Nokia as a driving locomotive or anchor firm, perhaps its dominance could lead to an overall vulnerability for many SMEs in the event of a repeat of Finland's economic recession of 1992.

At the heart of much of the activity in Oulu is R&D rather than manufacturing. Most of the latter is outsourced to the lower costing Baltic States of Latvia, Lithuania and Estonia. The research effort in Oulu concentrates very much on the interplay between the university, VTT and the local firms, including Nokia, Electrobit,, Microcell and to a lesser degree Nethawk. The importance of the North's importance to Finland's total research contribution needs to be recognised. Between 1989 and 2002 the share of R&D expenditure in Finland has grown from 1.8% to 3,5% of GDP and the share of business in that rose from 61.6% to 70.7%. (Statistics Finland, 2003). The bulk of the research expenditure was concentrated in four provinces: Uusimaa, Varsinais-Suomi, Pirkanmaa, Pohjois-Pohjanmaa (Northern Ostrobothnia) These areas normally vie for the top four places in the R&D expenditure league. Again, however, this only serves to illustrate the disproportionate role played by Nokia which has major facilities in all four provinces. It should not be assumed that because of its geographical isolation that Finnish research, especially in the North, is confined within national boundaries. Nokia, for instance has 37 strategic alliances world-wide and the university and the polytechnic have multiple partnerships with firms such as Elektrobit, Polar and Jot Automation within the region and beyond. To take but one example, the 'Technology Beyond the Gui' programme has a network comprising, Oulu University, Group

Ceybelius, a spin-off from VTT and Dutch and Belgian Universities as well as firms such as Philips of Eindhoven and Barco and ABC Interactive Solutions of Holland and Austria respectively. (Technopolis, 2002).

CONCLUSIONS AND THE FUTURE

In analysing the reasons underpinning the changing structure of the economy of Northern Finland in recent times, the role of the various actors is not easily disentangled and that is perhaps due to the corporatist tendencies that still persist in Finnish political economy. Hence while acknowledgement must be paid to the vision of Oksman and Ojala and to a lesser extent Simola, the role of the national government was paramount in putting in place the institutional context within which entrepreneurs and SMEs could prosper. Secondly, the role of the Oulu's City Council must not be overlooked in that it grasped the opportunity in the late 1970s to set up Technopolis. This is, indeed, an outstanding example of civic entrepreneurship. Moreover, when one considers that the original partners in Technopolis were the Council, the University and 18 firms then the case for the functioning of a Triple Helix is substantiated.

The growth in the number of firms in High Tech and related industries rose swiftly in the 1990s and again these were primarily small firms, whose founders shared a similar culture and mental model and who for the most part entered sectors where start-up costs were minimal. Moreover, the role of Nokia from the 1990s onwards was crucial in stimulating research and subcontracting activities, particularly at Technopolis. Bolstering this type of activity though depended upon high quality education in course provision and research, which was provided by the university, and to a lesser degree Technopolis and Oulu Polytechnic. Finally, it needs emphasising that while Oulu was and is undoubtedly the main location for these type of activities, the 'Polis' model was extended regionally across the northern provinces and, in conjunction with regional polytechnics and vocational schools, has encouraged not only the development of new High Tech firms in small towns and townships, but has facilitated the application of new technologies to traditional industries such as forestry and paper making.

The Oulu Phenomenon is now well established, but what of its future? Although there is a degree of optimism, doubts are harboured for several reasons. Firstly, like much of the High Tech economy in Finland, a great deal depends upon Nokia's success and, as Zysman, says, there is no guarantee that Nokia will be as successful in the future as it has been in the past. Indeed, he suggests that Finland in general may simply have to keep on re-inventing itself if it is to remain at the cutting edge of future digital technologies (Zysman, (2004). Finland's overall success is perhaps too heavily dependent on Nokia. In other words, Nokia, Oulu and Finland will have to run faster simply to keep ahead of or even up with intense global competition in fast developing digital technologies and rising product market standards. Moreover, the over-reliance on telecommunication and related industries is dangerous and there is an obvious need for increased diversification through increased expansion in bio and nano technologies. The situation might well also be eased by the growth of modularised production techniques and so even small and medium sized Finnish firms will be able to find niche markets well beyond their national frontiers as have both Electrobitt and Polar and so reduce their reliance on the country's larger firms. This, of course, might be assisted by the increasing fragmentation of global supply chains (Zysman, 2004).

In Oulu there is an awareness of the above dilemma and steps are being taken to ensure continued progress in the North. Basically the route chosen is an increased stress on education at all levels, particularly to raise competences and skill levels among the young and so ensure a ready supply of highly educated labour. In 2005, for example, Northern Ostrobothnia received a considerable boost when it received a loan of E25 million euros from the European Investment Bank to boost higher and vocational education in the knowledge-based sectors and so boost future employability not only in Oulu, but across the region in smaller towns and townships. This, of course, fits in neatly with TEKES's programmes for enacting national policy to encourage the growth of SMEs in the North. In other words, though much has been done to halt rural drift, it has not ceased entirely as Oulu itself acts as a magnet for young people because of job opportunities. At least there is an awareness of the challenges to come, but to tackle these will require a lot of imagination and risk taking, but that goes with the territory in high quality entrepreneurship and the maintenance of Finland's status as the most competitive country on the planet.

REFERENCES

- Ahokangas, P., and Ransanen A, (1998), "Growth of small-technology based firms in the Oulu Phenomenon and parallel Nordic developments," in: Virtanen, M (ed) Proceedings of the conference on growth and job creation in SMEs, 7-9 January, Mikkeli Polytechnic, Finland.
- Batterbury, S., and Hill S. (2003), "Assessing the impact of higher education on regional development", *Regional Studies Conference*, University of Pisa, Pisa, Italy, 7-9 April.
- Bergman, E and Feser, E. (1999), *Industrial and Regional Clusters: Concepts and Comparative Applications*, The Web Book of Regional Science, Regional Research Insitutute, Vir, West Virginia University.
- Bio Centre Report (2002, Annual Report Oulu, University of Oulu.
- Breschi S and Malerba F. (21001), 'The geography of Innovation and clustering: some introductory notes.' *Industrial and Corporate Strategy*, 10 (4)817-833.
- Donnelly, T, Morris, D and Hyry, M. (2005). "The Bothnian Arc". *Regional Studies Conference*, University of Aalborg, Aalborg, Denmark, 27-29 May.
- Ezkowitz, H. (1997). "The triple helix: academy-industry-government relations in the growth of neo-corporatist industrial policy in the US," in: S. Campodal, (ed) Managing technological knowledge transfer , *EC Social Sciences COST A3*, vol 4. Brussels, EC Directorate General Science Research Development.
- Gertler, M, and Wolfe. D.. (2002). *Innovation and Social Learning: Institutional Adaptation in an Era of Technological Change* London, Palgrave MacMillan..
- Haikio, M. (2001). *Nokia Oy:n historia, Globalisatio*, Edita, Helsinki.
- Hannula, M. (2002). Interview, Head of the Regional Planning Council for Northern Ostrobothnia. Interview 6 July.
- Hultin, H (2004). 'Strategic balance:driving innovation and maintaining performance,' Track 5, Strategic Management Society, 24th International Conference, San Juan, Puerto Rico. http://www oulu.ouka.fi/efa/pdf/RBG_sms%20_2004.pdf. Accessed 3 November 2005
- ICF Consultin. (2000). *Choosing a Future: A new Economic Vision for Ottawa*. The Ottawa Economic Generator's Initiative. Ottawa..
- Infortech Report (2002) Oulu University of Oulu.
- Inguen, B.(2001). "Universities create new business", *Business Finland*, 15-16.
- Kenny, M. ed. (2000). *Understanding Silicon Valley, The Anatomy of an Entrepreneurial Region*, Stanford University Press, Stanford Ca..
- Kess, P, Kess, V, Pikka, V and Pelyoniemi, M. (2001), Pro Electronica – projekin vaikkuttavuus Oulun sedulla. Oulun Yliopisto tuotantotalouden yksikon tyopapereita. 2/2001, Oulun Yliopisto.
- Kuivalainen,, M. (2003). Interview: Nokia Direcot, Oulu, 4 November.
- Lee, C, Miller,W, Hancock, M, Rowen, J, eds. (2000), *The Silicon Valley Edge: A Habitat for Entrepreneurship* Stanford Ca. Stanford University Press.
- Look Oulu. (2005) Oulu Municipal Council, Oulu.
- Lovio, R. (1993.). "Evolution of firm communities in new industries," *Acta Academica Helingiensis*,

- Marjomma I. (1992-2005) Interviews: Senior lecturer, Department of English Studies, Oulu University. Mr Marjomma has been kind enough to answer many questions on the Oulu Phenomenon over many years and we are grateful to him.
- McCloughlin I. (1998). "Creative technological change" in: Preece, D and Bessant J, *The Management of Technology and Innovation*, London, Routledge.
- Nokia, (1995) The award of the Nokia Foundation in 1995 to Mr Lauri Kuokkanen, Nokia Press Release 6 December.
<http://www.press.nokia.com/PR/199512/777660+5.html>. Accessed 3 November 2005
- Oksman, j. (2002). Interviews. Professor Oksman is the former Vice Chancellor of Oulu University (Professor Oksman was interviewed several times both officially and unofficially).
- Ornston, D and Rehn, O (2004), "An old consensus in the new economy? institutional adaptation, technological innovation and economic restructuring in Finland,"
[http://www.bvrie.berkeley.edu/research/partners and projects. html](http://www.bvrie.berkeley.edu/research/partners%20and%20projects.html)
- Oulu Business Review*. (2002), Centre for Innovation and Learning, Oulu , Oulu University.
- Paloniemi, j (1991), *Raportti Oulun alueen huipputeknikan tritystoiminnasta*, Oulun yliopisto
- Polar Electric. (2002). Polar Electro,
http://www.polar.fi/polar/channels/eng/polar/about_polar.html. Accessed 3 November 2005.
- Salo, M (1998), *History of the University of Oulu 1958-1993*, Oulu University of Oulu.
- Simila, P, (2002-4, Interview with former Director of Regional Development in Oulu 1978- 1999 and currently Dean of Oulu Business School. Mr Simila has discussed many of the issues associated with Oulu's Development with us over many years of working together and in friendship.
- Takanen, (2002). Scanfil Oy, Unpublished presentation, Ylivieska.
- Technopolis, (1983-2004). *Annual Reports*, Linnanmaa, Oulu Technopolis,
- Tunkelo, E. (1988). *Oulus Technologiakyla 1980-1988, Miten systyi ouluilmio?* SITRA, saja a Oulu
- Ultracrea,(2005), *About Ultracrea*, [http://www. Ultr-crea.fi/](http://www.Ultr-crea.fi/). Accessed 3rd November 2005
- Vilmi, ., (2002). Interview, Nokia Director, Oulu, 15 November.
- VTT (1974-2004) Annual Reports, Helsinki
- Wikstedt, K. (1999). Municipal Councillor involved in oulu's economic development in the 1970s and 1980s Interview, *Kaleva* (Regional Newspaper in Northern Finland).
- World Economic Form (2005) Global Competitiveness Report, <http://www.weforum.org/site/homepublic.nsf/Content/Global+Competitiveness+Progr...> Accessed 26 October,2005.
- Yin, R. (1994). *Case Study, Research, Design and Methods*, London, Sage.
- Yli-renko and Autio E (1996), "The catalysing impact of new technology based firms in industrial technological renewal", Working paper, Helsinki University of Technology.
- Zysman, J. (2004). "A second Finnish transformation", *Helsingin Sanomat*, 19 April