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National innovation systems and domestic multinational corporations:

DESKTOP STUDY REPORT

Editors: Daniel Friberg

Research on Nordic corporate internationalisation

Main findings

DOMUS literature review report

Edited by Daniel Friberg

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<table>
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<tr><td colspan="6">Institutions: IKED</td></tr>
<tr><td colspan="6">Abstract:
This project has investigated outward foreign direct investments from the Nordic economies, and analysed the role domestic multinational companies play in their respective Nordic home economies. The project consisted of a desktop study of existing research, a quantitative study of FDI flows and the innovation behaviour of multinationals, and a qualitative analysis based on interviews conducted with leading managers, researchers and owner respondents in 17 Nordic domestic multinationals.

The following report summarises existing research on Nordic corporate internationalisation and its implications.

Through the project as a whole, valuable new insights into multinational corporate behaviour and strategy have been gained. It explicitly addresses the home-base implications of corporate internationalisation, and provides a theoretical framework for understanding the conditions under which the foreign activities of such companies provide valuable knowledge inputs into the domestic innovation systems of the Nordic countries.</td></tr>
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Executive project summary

The purpose of the project

DOMUS had as its stated objective to *'… study the role of large domestic multinationals (DOMs) in the national innovation system (NIS)'*. Three specific research questions where initially formulated:

1. Identify the factors that influence localization decisions of headquarter functions and other *strategic* (Benito et al 2002) activities, including R&D

2. Map the effects such companies have on the overall capabilities of their respective national innovation systems

3. Investigate the effects a multinational presence has on the home activities of DOMs

Corporate internationalisation raises critical questions concerning the conditions under which activities abroad may generate knowledge spill-over domestically – into the home-base NIS; and the conditions under which the knowledge intensive parts of corporate activities, and consequently the productive knowledge base, over time can be expected to follow simpler operations out the country of origin. These questions are by large unresolved in existing theoretical and empirical research, first and foremost as a result of a lacking theoretical framework (Narula and Zanfei 2005) that incorporate sound perspectives on both localizational decisions under different technological conditions (Andersson and Friberg 2005, Herstad et al 2006b); and the workings of the MNE as a research, development and innovation network in its own right.

Method

The research strategy of DOMUS has therefore to a large extent been explorative and qualitative; i.e. based on desktop study of existing research and analysis of data gathered through interviews in selected, Nordic DOMs. This has been supported by qualitative analysis based on Community Innovation Survey, conducted through the DOMUS predecessor FOTON (Ebersberger and Lööf 2005) and specifically for DOMUS (Ebersberger 2006, in Oksanen and Rilla (eds) 2006). There are several reasons why a qualitative research strategy has been chosen; the most important one being a combination of quantitative evidence readily available from FOTON and the need for explorative research to feed into general theory development. It is our clear opinion that, given the existing state of affairs at the research frontier, in-depth firm level analysis with the purpose of making *analytical* generalizations concerning basic socio-economic forces at play (Yin 1984, OECD 2006:65) must feed into general theory development which only then should be further refined and empirically validated using quantitative methods. What qualitative research lacks in empirical representativity it by far compensate for by allowing direct dialogue with representatives of the phenomena in question. It allows us to avoid ‘black boxing’ the core actors, firms. This particularly applies when dealing with the generation, flow and accumulation of non-measurable resources – knowledge.

The project resulted in three different research module reports, presenting in detail the findings of each research module, and a synthesis report which draw on all the different modules in order to answer the research questions initially formulated.

Main conclusions

Concerning the first question, the project identified market access to be the main, overall driver of corporate internationalization. The project further point out that access to cheap factors of production at least historically appears to have been a driving force of fairly low importance. This conclusion, however, neglect the large diversity in motives and requirements that exist between different sectors.

The project further questioned the extent to which the internationalization of R&D and other knowledge-intensive activities are driven by the properties of the places in which MNEs invest (the so-called localization-specific advantages highlighted in the traditional understanding of MNEs). This question is raised on the background of mergers and acquisitions being the dominating mode of entry into a new market. Alternatively R&D abroad, in an acquired firm, could be considered an outcome of the in-house competencies of that acquired firm, and thus not a localization decision but a localization outcome. Evidence from interviewed companies clearly support the project in concluding that the internationalization of R&D, and in particular what is traditionally considered localization decisions, is a much more complex and differentiated process than what is assumed in the traditional theory of the multinational enterprise. As this assumption has been guiding most existing studies and policy, further research is needed to provide a clear answer to this question. This research need to account for industry branch differences between knowledge bases and consequently differences in availability of relevant knowledge in different places.

Answering research question number two, the project emphasized that domestic multinationals predominantly are key actors in their national innovation system, and hence that their activities have a large impact on these. This reinforces the relevance of research question number three, on which the project put its main emphasis.

On research question number three the project concluded that DOMs serve as global knowledge pipelines for the domestic innovation systems, but predominantly do so within sectors and technological fields in which the NIS is already specialized. These are the sectors in which the different economies are most likely to develop strong DOMs, the sectors on which those same DOMs are most likely to develop strong in-house competencies domestically while remaining embedded in linkages to external, domestic NIS actors – and the sectors and technological fields in which NIS as a whole most likely will be able to absorb externalities.

Research implications

The project propose a set of complementary studies to be conducted in order to utilise and further refine the theoretical perspectives developed by DOMUS, and to build on this to significantly increase our understanding of the dynamics and implications of corporate internationalisation. Specifically the project also suggested conducting a large study of the role of Nordic multinationals in Nordic economic integration.

Foreword

DOMUS – Innovation and the role of domestic multinationals – was conducted in the form of three research modules designed to provide complementary insights into the phenomena in question – Nordic corporate internationalization and the implications of this for domestic innovation systems (NIS). The following *Module* 1 report is based on a desktop study of existing research at the national levels. *Module* 2 mapped corporate internationalisation from the Nordic countries (Rilla and Oksanen (eds) 2006) and provided more in-depth quantitative analysis (Ebersberger 2006), whereas *module 3* consisted of qualitative analysis based on data gathered through interviews in selected Nordic multinationals (Herstad (ed) 2006). The core analysis and main findings of the project is presented in a synthesis report which build on all research modules (Herstad and Jonsdottir (eds) (2006)

The first chapter of this module 1 report describes the internationalisation of domestic multinationals in each country. Chapter 2 addresses the internationalisation of R&D which has become a recently increasing phenomenon and of special importance for (small) knowledge based economies. In Chapter 3, the implications for the national innovation system (NIS) are brought up followed by a short summing up chapter at the end. The report is edited by Daniel Friberg, based on contributions from the different national teams (se below).

Differences in data availability and national focus on sources of statistics of course provide us with a slightly different focus and direction concerning data collection from the different Nordic teams. As an example data on internationalisation for Iceland is very scarce as it is a relatively new phenomenon and internationalisation of R&D is virtually non existent. Finland and Sweden on the other hand have rather plenty of data due to historical interest in following the internationalisation process of the national industry. They are furthermore more specialised towards investments in R&D making questions of R&D more monitored as a whole. Norway and Denmark rely, in relative terms, more heavily on primary sector and medium high technology products which reflects in the statistics gathered by them. The methods utilized by the data collecting institutes of each country of course differ as well, just as does the emphasis of the different national teams participating in the study. Congruence is thereby limited to the form of presentation, consisting in subdivisions of chapters encompassing the mutually agreed upon most interesting and relevant discourses, concerning internationalisation of DOMs. Tables and figures of a more detailed character have also been excluded from this chapter, and decided to be presented in the second module instead.

1. Internationalization of DOMs

FDI is undertaken primarily by large firms and serves as the prime driver for restructuring, enhanced knowledge flows, access to international sales networks, and efficiency gains. There is evidence that SMEs are now increasingly engaged as well. For this category of firms, it is equally pivotal to be able to exploit the virtues of globalisation for the sake of becoming more competitive, follow customers abroad and upgrade the specialisation of operations. Being the most vulnerable to deficiencies in local financial markets, however, and being in the weakest position to handle fixed costs and gauge the risks, these firms are also particularly vulnerable to the downsides of the ongoing restructuring process.

Denmark[1]

Danish multinational companies with international activities are not new phenomena. Since especially the late 1800s, Denmark has had a number of multinationals with affiliates abroad, all having developed into large industries within their field: F.L. Cement company, the East Asiatic Company trading and shipping company, The Great Northern Telegraph Company, A.P Møller Shipping and from the 1960s also oil, retail etc.

As a small open economy international activities has all along been part of the development. However, several surveys and organizations point to an increasing internationalization, amongst other of FDIs, in the recent app. 15 years.

FDI has increased through the 1990s with some very high peaks around 2000 (UNCTAD, 2005), peaks however partly explained by isolated investments in air transport and other transport industries, electricity and other supply industries and financial services related to deregulation (Birch Sørensen, 2005).

A survey by the Confederation of Danish Industries, DI, (DI, 2003) shows that outward FDI is found to primarily be undertaken in sales and production. The questionnaire was based on 77 of DIs members having their headquarters in Denmark and affiliates abroad.
As of 2006 289 of the 623 companies, registered by the National Bank are having affiliates abroad with an owner share of more than 10%.

The major share of Danish foreign direct investments has so far gone to the developed countries, This pattern which is true for developed countries in general may, however be shifting and becoming more international, with an increasing share of investments going to the developing countries (UNCTAD, 2005). The major share of Danish companies' relatively low investments in developing countries are going primarily to China followed

[1] By Annegrethe Hansen and Jørgen Lindegaard Pedersen, DTU

by Hong Kong, Brazil, Mexico and Singapore (UNCTAD, 2005) . The Confederation of Danish Industries furthermore finds that more than half of the key production in 49 of the most important production facilities abroad, is located in high income countries (DI, 2003) indicating other advantages of outsourcing than production costs.

Regarding the sectoral distribution of FDI, the tertiary sector plays a large and increasing role, a development which is also observed internationally (UNCTAD 2004). Around 2000, in which the dramatic increase in FDI took place, more than 80% of foreign direct investments happened in the tertiary sector. These numbers may however have been exaggerated by the way companies have been categorised by UNCTAD. For example Vestas, the wind mill producing company appears in the tertiary sector category, according to UNCTAD statistics though we would intuitively have categorised it as a secondary sector company. Also some of the construction firms, now categorised in the tertiary sector, may have been categorised in the manufacturing sector earlier.

Regarding, employment more than half of the employment in foreign affiliates is in the EU-15 countries, and only 2% are in Chinese affiliates. Furthermore, 61% of the employment in foreign affiliates are found in the service and transport sector compared to only 28% in manufacturing (Statistics Denmark, 2006). DI, 2003 finds a relative increase of FDI in production compared to sales, though sales activities still dominate the foreign direct investment flows. Both DI, 2003, Statistics Denmark 2006, and Maskell et al., 2005, find increasing investments in R&D activities abroad as well as in Denmark.
DI, 2003 states that employment in industry has decreased since 1996, but that in the surveyed multinational companies, employment in general has been unchanged. In half of the companies, employment has increased in the Danish part of the company, and in about 1/3 of the companies FDI has led to layoffs of Danish employees. The Danish Council for Trade and Industry (Danmarks Erhvervsråd) and The Commission for Future Growth (Tænketanken Fremtidens Vækst), undated, conclude that Denmark does not in general loose jobs as a consequence of internationalisation and that international companies become increasingly international with regard to organisation, employment and turnover.

Within the Danish manufacturing sector, the food, beverage and tobacco industry had the largest inflow of FDI as well as the largest stock.. FDI in the chemical sector have generally been increasing, although great fluctuations have been the case

Most literature refers to internationalization as taking place in large companies. This becomes increasingly so, when, in addition to sales you refer to production and R&D. Small multinational companies with R&D are found within certain niches such as in new biotechnology companies, but few, if any, have R&D affiliates abroad.

Finland[2]

The internationalisation of Finnish companies started relatively late if compared to other European small and open economies. "As late as in the 1970s, Finnish companies'

[2] By Juha Oksanen and Nina Rilla, VTT

international activities consisted mainly of exporting from Finland. Only a few companies had sales offices abroad, and even fewer production units. During the past two decades the situation has changed dramatically. Today, the large Finnish corporations are among the most internationalised in the world." (Ali-Yrkkö, Lovio, Ylä-Anttila, 2004, 6)

Mannio et al. (2003, 14) have divided the internationalisation of Finnish economy, and companies since 1945 onwards into three phase. The first phase ranging from the late 1940 to the mid-1970s was characterised by export-led growth, reflected also in national trade policy decisions. Large export oriented firms were primary actors of the period. These companies were also already then well integrated in the international economy.

Internationalisation of production through foreign direct investments marked the late 1970s and 1980s. Mannio et al. (ibid. 17) consider especially the 1980s as a "learning period for (Finnish) business executives and policy-makers". Fast internationalisation and launch of — in many cases first — large scale operations abroad was markedly trial-and-error type of process which provided valuable experience for management but did not, on the other hand, guarantee profitable business. Third and final period reaching from the beginning of 1990s to present is in the view of Mannio et al. (ibid. 17) typified by "internationalisation of ownership as part of the global integration of markets for capital, goods and technology". A thrust for the development was given by liberalization of foreign ownership and abolishment of remaining capital control in 1992, accession to EU in 1995 and entry to EMU in 2000.

Since the mid-1990s foreign direct investments made by Finnish companies have grown remarkably. Simultaneously the share of foreign owners in Finnish companies has increased. As a result (large) corporations have gone through a transformation into truly "multinational enterprises which have substantial foreign ownership, acquire knowledge through foreign located R&D units, have headquarters or division headquarters abroad, and have a substantial part of their productive capacity outside Finland" (Mannio et al. 2003, 17). Today, roughly 50-70 per cent of total personnel of large Finnish multinational firm are located in sites abroad, of them around 20 per cent outside Europe.

In spite of above mentioned significant internationalisation of the ownership of Finnish multinationals, Finnish owners (the state, institutions, individuals and companies) "still hold a strong position among the owners of many companies. (Lovio 2004, 23)

Transformation to a multinational company has not, at least so far, markedly affected to location of headquarters of Finnish corporations. For instance, the registered headquarters of the Finnish corporations studied by Lovio (2004, 23) all still locate in Finland. This doesn't tell the whole story however, because according to Lovio "it is becoming increasingly common to disperse the head office functions among a number of different countries". As an example Lovio mentions Stora Enso, which top management locates on permanent basis in London even though its head office is both in Helsinki (legal domicile) and Stockholm.

Lovio has estimated that only some 20 per cent of management of large Finnish MNEs is in foreign hands and few MNEs have foreign CEO. In fact, at the time of study "Kone Corporation was the only company with a foreign chief executive officer". The latter example seems to hint to strong cultural ties which domestic enterprises have to their country of origin.

Manufacturing units abroad close to new markets (with anticipated increase in sales, cost savings etc.) have been a major target of acquisitions carried out by Finnish large companies. By and large, acquisition of foreign companies and units has been a key expansion strategy for many domestic multinationals. Also, through acquisitions Finnish corporations have often got new complementing products to their product palette/family.

Lovio (2004, 28) notes that the Finnish larger corporations' markets are clearly more internationalised if compared to the production and personnel of the companies. Share of foreign turn-over of total company turnover in 2002 was in many larger companies close or over 90 per cent and in case of Nokia 99 per cent.

Iceland[3]

Excluding the fisheries sector, domestic multinationals are a fairly recent phenomena in the Icelandic context. In a newly published book Sigfússon (2005: 20) argues that there is only one truly transnational corporation with headquarters in Iceland, the generic pharmaceuticals producer, Actavis. Despite its smallness, the Icelandic scene is an interesting one because it has been changing extremely rapidly in the last five to ten year. Icelandic investors have been making a brisk entrance into the international scene. Sigfússon is optimistic about the positive effects of this expansion on Icelandic innovation systems. He points out that Iceland has, in the past, lacked wealthy entrepreneurs capable of investing substantially in innovation (ibid: 13). Some sectors, such as the fisheries, aviation, generic pharmaceuticals production and film have become truly global (Jónsson, 2005: 181). Furthermore, Baugur Group has been growing rapidly in the retail sector in the UK and Scandinavia. The sudden and enormous increase in foreign direct investment of Icelandic enterprises abroad has its roots in fish production, but, as Jónsson points out, plentitude of natural rescources is only one part of the explanation. Privatisation of the banks and general transformation of the economy into an open market-economy also play a pivotal role.

In a paper presented at ISNIE Barcelona conference in September 2005, Eggertsson and Herbertsson (forthcoming) also analyse historically the economic development of Iceland, focusing on the changing role of the banks. They stress that since the liberalisation of the financial markets and the privatisation of the national banks, the three main Icelandic banks have expanded to outgrow the Icelandic economy. These institutions have moved towards universal banking and are among the fastest growing banks in the world. Furthermore, they are key players in the internationalisation of Icelandic industry, providing both extensive knowledge, experience and financing.

[3] By Asdis Jonsdottir, RANNIS

Research on the internationlisation of DOM's in Iceland is scant and little is yet know of the effects of these extensive changes in the Icelandic economy. The recent changes in the Icelandic economy call for more extensive research in the area.

Norway[4]

In contrast to other Nordic countries, if excluding shipping, outgoing FDI from Norway is a comparatively recent phenomenon (Heum and Middelfart 2002). Although outgoing FDI has accelerated during the last 15-20 years, Norway is still lagging behind our Nordic neighbours (Grünfeld 2004). This is illustrated by the 'outward FDI performance index' developed by UN (2004), by which Sweden, Denmark and Finland are ranked as top performers and Norway at 33rd place (Grünfeldt 2004). In absolute terms the most important host region is EU countries, where Germany and UK stand out in terms of 1998-2001 growth. Excluding the outlier of Switzerland, the highest growth is found in the group 'other countries', which include China.

According to Grünfeld (2004), the five largest Norwegian DOMs – Hydro, Statoil, Telenor, Norske Skog and Aker Group - account for some 70 per cent of all registered outgoing FDI from Norway, and the 20 largest DOMs account for 85 per cent. The petroleum sector alone account for 20 per cent of the stock. Grünfeld however stresses that focusing only on large, domestic multinationals in what is inherently capital-intensive industries easily underestimates the extent of FDI-based internationalization by other smaller and less capital-intensive firms. A survey of the 100 largest DOMs (Heum et al 1998, Selfors 1999 only managed to identify 870 of the 5000 registered foreign subsidiaries, hence indicating the existence of a substantial population of SME DOMs (Grünfeldt 2004).

Benito et al (2003) characterise the 10 largest Norwegian DOMs as *'…almost without exception old-fashioned conglomerates that operate in a variety of industries and product categories'* (ibid:70). Similarly, based on a survey with responses from 38 Norwegian DOMs Narula (2002) identifies to distinct groups:

a) *Traditional industries, formerly protected firms and/or state-owned firms.* This group is dominated by natural resource based companies such as Hydro and Statoil, or companies in formerly protected/state monopoly markets (Telenor). Only two 'genuine' private actors can found in this group; Aker Group and Norske Skog. These companies have the common characteristic that they use competencies developed in interaction with domestic NIS as the basis for their internationalization, are successful in doing so and thus build on and contribute to NIS specialisation

b) *Specialized and technology-intensive companies*. This group has the common characteristic of higher R&D intensities and of less embeddedness in the domestic IS. It can be argued that rather than building on NIS strengths they are attempting

[4] By Sverre J. Herstad, NIFU STEP

to escape limitations inherent in NIS specialisation. The group is inherently far more diverse than group 1 above.

Selfors (1999) is based on a postal survey of 70 Norwegian DOMs, and contains explicit questions about motive for internationalisation and emphasis on different localisation advantages (see table 8). Market access/proximity to customers is identified as by far the most important reason for FDI-based internationalisation. Other factors stated as important to respondent firms are access to know-how, in-house synergies and reduced logistics costs. Factors considered of less importance are – interestingly – access to natural resources, taxation regimes, access to low-cost labour and favourable conditions for R&D. Godø and Gulbrandsen (2005) similarly argue, based on in-depth interviews with eight large Norwegian DOMs, that *'none of the companies decisions to internationalise appear to be influenced very much by national policy'*.

Sweden[5]

So far, the bulk of outward Swedish FDI has targeted developed countries which have production costs similar to those of Sweden. This has been seen as evidence that outward FDI generally has not been driven by high wage or production costs, but by other concerns, such as those related to innovation and technology, access to markets, strategic considerations, and so forth. FDI targeting developing countries, representing only a minor part, has been interpreted as an instrument to reduce costs in standardised production.

Investigating the 80 largest Swedish-based MNEs, Hansson (2004) found that outward FDI in developing countries has strengthened a specialisation in home operations towards a higher share of well-educated workers, i.e., brought a shedding of standardized production. He found no significant relation in the case of outward FDI in developed countries, which so far accounted for 90 percent of the outflow. While developed countries still account for the bulk of outward FDI, however, the share that is undertaken in countries with notably lower costs is on the rise, and so the quality of operations in these countries.

The positive impact of outward FDI on employment in Sweden appears to have weakened from the 1970s onward. Firm level data suggests that production abroad substituted for exports from home in the 1980s, including to third markets (Svensson, 1993). More recent studies found a substitution effect between outward FDI and employment in Sweden (Kokko and Gustavsson, 2003; Becker et al., 2005). At the same time, the industrial sector has displayed remarkably high productivity growth

In Sweden specifically, foreign control of domestic industry used to be restricted, meaning that firms remained nationally controlled although production expanded abroad. FDI outflows vastly outweighed inflows until the early 1990s. Following regulatory reforms, and the announcement of Swedish membership in the European Union, inflows increased strongly though and, since 1994, have largely been on par with the outflows. In recent years, both have declined, with the outflows again dominating in 2003 and 2004. Stock of outward

[5] By Daniel Friberg, IKED

FDI remains bigger than the stock of inward investment, following from the earlier expansion, although the gap has narrowed since 1996.[6] These trends are reflected, for instance, in employment. In 2003, Swedish enterprises reportedly had more than 950 000 employees abroad while foreign firms employed some 560 000 in Sweden. In 2004, the number of employees in foreign owned firms has declined to 544 000 (ITPS, 2005*a*). In the following, we briefly review some of the main patterns on the outward and inward side respectively.

Swedish-based MNEs typically first established sales offices and then production units abroad. Today, some 65 percent of their employment and 43 percent of their R&D is accounted for by foreign affiliates (ITPS 2004; ITPS, 2003).7 Most of their overall expansion has been directed to the EU and the US where sizable M&A have accounted for the bulk. The figures rose substantially in 1990, with the acquisitions of Feldmühle in Germany and Reedpack in Great Britain by STORA and SCA respectively. As of 2003, around a fifth of all employees abroad were in the US and almost 50 percent in the EU15. For Swedish international companies as a whole, 84 percent of their employees abroad were located in OECD countries. The share of employees in Asia has seen a steady increase with China and India gaining in importance, and the share of employees in these countries currently amounts to about two percent each.

2. Internationalisation of R&D

In a comparative study of internationalisation patterns in Norway, Finland and Denmark by Benito et al (2003), an important distinction is made between the internationalisation of 'operations' (production, marketing and sales, etc) and the internationalisation of 'strategic functions'. The latter include R&D, HQ functions and equity. Their main finding is striking; strategic functions remain home-base oriented and only one corporation in the sample is identified as having moved its corporate HQ abroad[8]. The ten largest Norwegian DOMs do however show higher degrees of internationalisation than the largest DOMs from Denmark and Finland when measured as share of division HQs abroad and share of R&D abroad; but lower degrees of internationalisation of equity. The latter is not surprising, given on the one hand the role of foreign equity in Finland and on the other hand take-over blocking state ownership in Norwegian DOMs. The degree of internationalisation of equity is also found to be low in Denmark. This is neither surprising given the role of individual ownership and foundations in the Danish economy. Thus, Benito et al (2003) conclude that while 'operations' are increasingly internationalised, firm strategic resources remain embedded in their respective home countries. Note that this strengthens the argument that home-base system of corporate governance continue to constrain firms even after extensive internationalisation. Whereas DOMs appear to be scarcely internationalised with respect to strategic functions HQs in

[6] Percentage wise, the gap has shrunk fairly steadily, from 52 percent in 1996 to 14 percent in 2002, although it increased again in 2003 to almost 25 percent.

[7] Data is derived from 20 large Swedish companies (industry groups).

[8] Former Kvaerner, during the manic international expansion under former CEO Erik Tønseth. Kvaerner is now part of the Aker Group, and headquartered in Oslo.

many medium-sized countries has seen an increased outflow during the last decade, this is usually the result of a foreign takeover and after a lag of a few years the HQ moves out. For example while 7-8 percent of Sweden's 250 largest firms had their HQs abroad at the start of the decade, by 2000 the ratio had increased to close to 30 percent (NUTEK, 2000). Foreign-owned companies accounted for the bulk of the outflow. No research or data exists on the internationalisation of R&D in Iceland.

Denmark[9]

UNCTAD, 2005 and DI, 2003, and others, refer to increasing company R&D in general, but also to an increasing share of company R&D being carried out in companies abroad, either in the companies' own affiliates or in other companies.

As mentioned elsewhere, Danish industry development has to a large extent benefited from knowledge developed outside of Denmark, but internationalisation of more formal R&D may be a recent phenomenon. Though policy documents, for example from the government's Globalisation Council, still tend to focus on the role of national competences, innovation and value added production, a number of other sources point to the increasing internationalisation as influencing development.

The recent tendencies of internationalisation of R&D, following the internationalisation of sales and production, has however also questioned or created political concern about the vision of Denmark as a think tank, and how it effects the fate of the Danish innovation system. The tendency to move strategic activities abroad has been noted to be modest in Denmark so far, compared to a slightly more pronounced tendency in Finland and a more marked tendency in Norway (Benito et al., 2002).

The Danish Centre for Studies in Research and Research Policy, CFA, 2005, gives figures for the purchase of R&D abroad, showing an increasing share of the bought R&D as coming from companies that do not belong to the buying company. There is a rather large increase in R&D purchase from companies abroad in 2001 and 2003, primarily purchases from companies not belonging to the buying company. It is also found that the share of purchased R&D constitutes an increasing share, as the table below shows.

DI, 2003, with a slightly different perspective, in their survey finds that 5% of the employees in the important production affiliates abroad are employed within R&D. In addition they also note that these companies have more R&D in Denmark than abroad. Among the 66 companies (of the total of 77 included in the analysis) who gave satisfactory information on the distribution of activities in Denmark and abroad, 60% of the R&D was carried out in the Danish part of the company, 40% was carried out in affiliates abroad.

Also Maskell et al., 2005, give figures for the outsourcing of R&D. They find that 11.2% of the companies (30 companies) in their survey outsourced R&D. They state that most

[9] By Annegrethe Hansen and Jørgen Lindegaard Pedersen, DTU

outsource less than 10% of the activity (R&D) to low cost countries and that 20% of the companies in the survey outsource more than 10% (Maskell et al., 2005).

It is thus indicated that though the largest share of the private R&D is still carried out in Denmark, the large international firms increasingly buy R&D in companies abroad. Statistics Denmark and Maskell et al., further state that a number of companies plan to undertake more R&D abroad in the future.

With regard to policies addressing internationalisation of R&D, these have focussed on attracting R&D to Denmark. There has been more liberal regulation of immigration for workers in demand and a tax incentive to attract foreign researchers to Denmark with the possibility of deducting 150 per cent of foreign researchers' wages.

In addition, policy statements on how to keep or attract researchers to Denmark, has pointed to the low wages/high taxes in Denmark as an obstacle to keep or attract researchers to Denmark; but the statement about the motives for those moving out (or not coming) has not been looked into. Other surveys seem to indicate that those leaving Denmark return (with their knowledge) before the children start school. This has been taken as a sign of the attractiveness of the Danish welfare system and an egalitarian society. Neither this statement seems to have been further documented.

Environmental regulation has by a number of public and private researchers been stated to be a motivation for moving research abroad. Public GMO and plant research has been stated to be inhibited by Danish and EU legislation and therefore considered moved to China; if this has actually happened we have not tried to find out. Private R&D depending on the possibility to release GMOs into the environment is being carried out in the US, by Danish affiliates and by Danish researchers having moved to the US. Neither have we found out if regulation is the only reason.

Finland[10]

Finnish companies started to internationalise rather late their activities. This holds true also with firms' R&D activities abroad if compared to markets and productions. Nevertheless, in line with general trend the R&D operations have also internationalised at a growing rate during recent years. (Lovio 2004, 41)

In the past only a few Finnish multinationals have founded R&D and innovation centres abroad through new greenfield investments — Nokia Corporation being the most active one. Foreign R&D centres have often ended up in the hands of Finnish firms through acquisitions of production capacity/markets abroad. Seeing from another angle it seems to be easier for companies to cut down R&D activities abroad than in their country of origin. According to Lovio it is typical for Finnish MNEs to have a Finnish led R&D committee which target, among others, is to profile and organise company's research and development work and R&D co-operation with partners. (Interview with professor Lovio in 22.10.2005)

[10] By Juha Oksanen and Nina Rilla, VTT