DEVELOPING HIGHLY SKILLED WORKERS: REVIEW OF FINLAND

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Pursuant to Article 1 of the Convention signed in Paris on 14th December 1960, and which came into force on 30th September 1961, the Organisation for Economic Co-operation and Development (OECD) shall promote policies designed:

To achieve the highest sustainable economic growth and employment and a rising standard of living in member countries, while maintaining financial stability, and thus to contribute to the development of the world economy.

To contribute to sound economic expansion in member as well as non-member countries in the process of economic development; and

To contribute to the expansion of world trade on a multilateral, non-discriminatory basis in accordance with international obligations.

The original member countries of the OECD are Austria, Belgium, Canada, Denmark, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States. The following countries became members subsequently through accession at the dates indicated hereafter: Japan (28th April 1964), Finland (28th January 1969), Australia (7th June 1971), New Zealand (29th May 1973), Mexico (18th May 1994), the Czech Republic (21st December 1995), Hungary (7th May 1996), Poland (22nd November 1996), Korea (12th December 1996) and the Slovak Republic (14th December 2000). The Commission of the European Communities takes part in the work of the OECD (Article 13 of the OECD Convention).

---

www.oecd.org

DEVELOPING HIGHLY SKILLED WORKERS: REVIEW OF FINLAND

FOREWORD

A major conclusion of the OECD Growth Study was that governments need more effective policies for developing human capital and realising its potential in order to increase productivity and growth. In the framework of the project on *Growth Follow-Up: Micro-Policies for Growth and Productivity*, the OECD is conducting peer reviews of member countries' policies for developing highly skilled workers. Peer reviews are also being carried out on policies for increasing access to venture capital, increasing the diffusion of information technology to business, and enhancing public/private partnerships for research and innovation.

This peer review of Finland was carried out by the Committee on Industry and Business Environment (CIBE) in March 2004. The report presents recommendations for policy actions based on the strengths and weaknesses observed in the Finnish policy approach to developing highly skilled workers to fulfill future industry requirements. Once a critical mass of countries has been reviewed, a cross-country comparative synthesis report will be prepared with a view to identifying common good policy practices.

This report was prepared by Taru Rastas (consultant) in conjunction with Candice Stevens of the OECD Secretariat. It is published under the responsibility of the Secretary-General of the OECD.

TABLE OF CONTENTS

ASSESSMENT AND RECOMMENDATIONS

Finland scores at the top of OECD countries on measures of the development and use of highly skilled workers, including educational attainment, female participation in the labour force, and upskilling through continuous education and training. Rapid growth and extensive structural change in the 1990s necessitated a retooling of Finland's workforce which was achieved with relative ease. The information and communications technology (ICT) sector now dominates the economy, accounting for 30% of GDP and almost 12% of employment, and has contributed to recent productivity growth. However, rapid ageing of the population and further structural evolution of the economy towards technology-based sectors present future challenges in fulfilling industry needs for skilled workers.

Finland's population is expected to retire earlier and more rapidly than in other OECD countries. Changes in industrial structure and within sectors will lead to higher demand for technical workers and researchers. Immigration of skilled workers into Finland is minimal, and there is the prospect of increasing brain-drain from the country as well. Although women are highly educated and comprise a large share of the labour force, career choices and wage gaps have combined to reduce their contribution to productivity. And adverse attitudes towards entrepreneurship and business failure have tended to depress start-ups from research and reduce mobility from the public to the private sector.

More flexibility is needed in higher education, public sector activities and wage-setting to enhance the responsiveness of these institutions to changes in industry demand for skilled workers. Recommendations have recently been made to enhance links between the two parts of the dual system of higher education -- the universities and the polytechnic institutes – where there has been limited research co-operation or student cross-overs. Similarly, Finland's large public sector workforce has had few transfers to industry, a situation which the 2004 *Entrepreneurship Policy Programme* may help to rectify. Although co-operation with the social partners has created effective worker training provisions, collective bargaining has contributed to a somewhat rigid wage structure. This has dampened the role of wage signals in allocating skilled human resources. A summary of progress and recommendations concerning policies for highly skilled workers in Finland is given in **Table 1**.

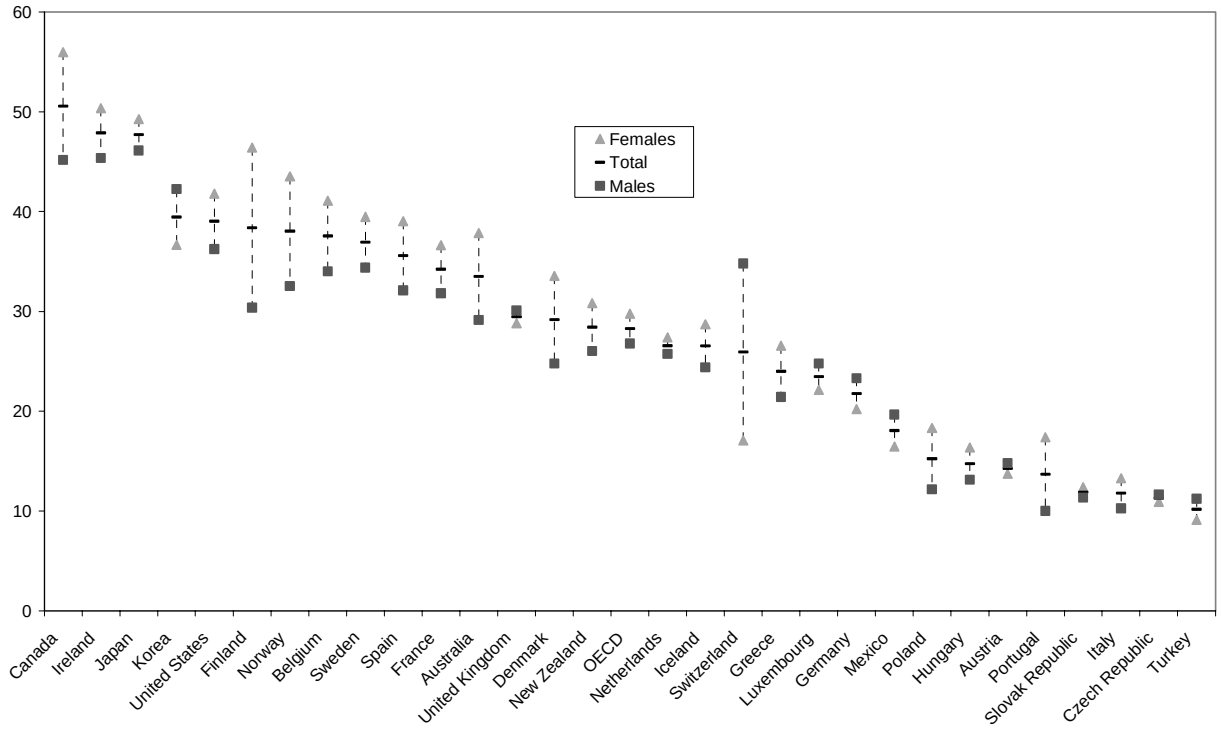
Table 1. Progress and recommendations

Area	Recent/planned action	Recommendations
Monitoring supply and demand of the highly skilled	Several public and private entities producing forecasts of overall, regional and sectoral labour market needs.	Strengthen co-ordination of public and private sectors in forecasting and dissemination of results to prevent mismatches in supply and demand of skilled workers.
Measures to increase enterprise and individual training	Competence-based exams, paid worker training leave, and small firm training assistance are all well-established.	Make training schemes more enterprise-oriented and modify employment law to accommodate flexible training approaches.
Measures to increase national worker mobility	Few barriers to mobility in private sector but weak wage signals; limited public/private sector mobility.	Increase flexibility of wage-setting mechanisms and adopt schemes to enhance mobility between the public and private sectors.
Measures to adjust to international worker mobility	Tax incentives for foreign professional workers and CIMO student exchange programmes.	Develop better integration programmes for foreign skilled workers and schemes for repatriation of skilled Finnish workers and students.
Measures to increase workforce participation by highly skilled women	Equality clauses and generous family-friendly practices.	Ensure implementation of labour agreements on gender equality and review gender effects of collective bargaining system.
Measures to develop human resources in science and technology	Steps to increase research spending, number of researchers and female technical personnel.	Enhance science teaching and researcher careers, foster public/private researcher mobility, and implement proposals to increase research by polytechnic institutes.

TRENDS IN SUPPLY AND DEMAND OF HIGHLY SKILLED WORKERS

Finland has one of the highest levels of educational attainment and shares of female tertiary graduates among OECD countries (**Figure 1**). Evaluations and international comparisons show the Finnish higher education system to be comprehensive, relatively well-resourced, cost-effective in terms of expenditures per student, and a leader in terms of the quality, innovativeness and learning outcomes of studies (OECD, 2001*b*). Major reforms were undertaken in the 1990s to increase the responsiveness of education and training structures to changing labour market demands. A system of polytechnic institutes (*Ammattikorkeakoulut*) (AMK) was created to offer more practical vocational and occupational training. This dual system of higher education now comprises 20 universities and 31 polytechnic institutes. A recent OECD review attested to the success of the polytechnic institutes, which accounted for more than 58% of all new tertiary education students in 2000 (OECD, 2003*c*).

Figure 1. Educational attainment in OECD countries, 2001
(Percentage of the population of 25 to 34-year-olds with tertiary education)

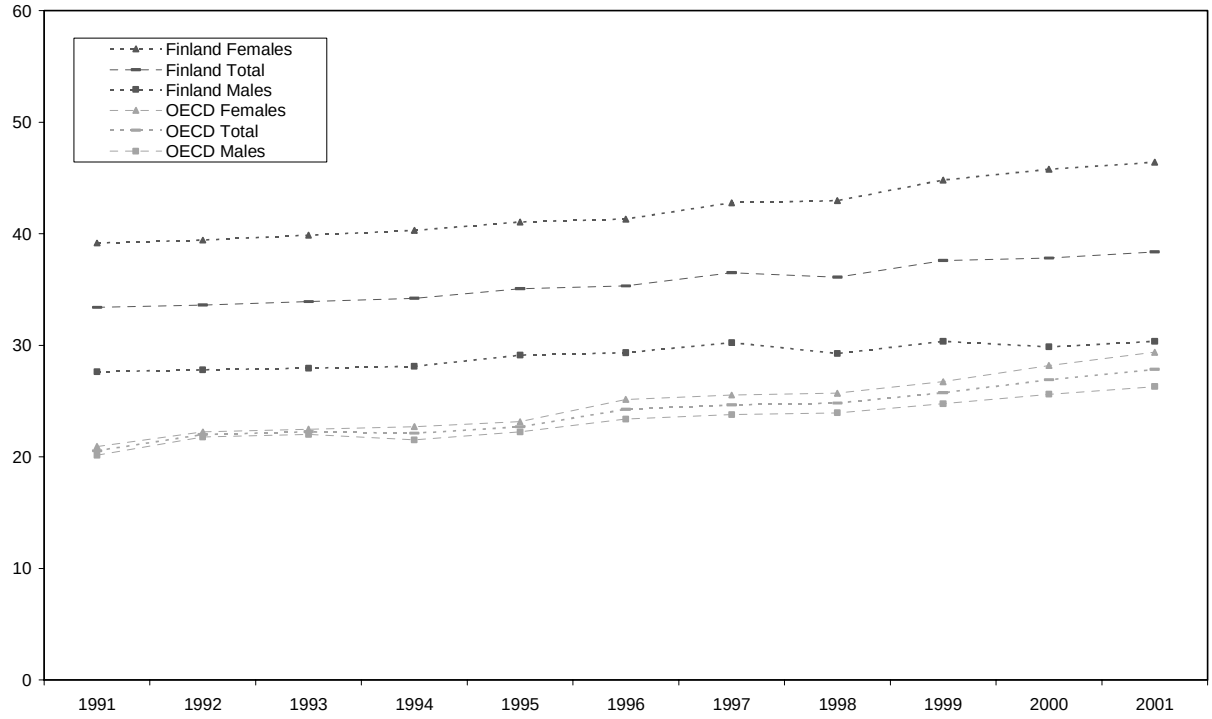


Notes: Includes tertiary type-A education, which corresponds to tertiary academic education (university), and tertiary type-B education, which corresponds to tertiary vocational education (practical/technical/occupationally-specific programmes).
Source: OECD (2003), Education at a Glance.

Finland offers places in higher education to 65% of the average age cohort, with the result that educational attainment is among the fastest-growing in the OECD area (**Figure 2**). During the 1990s, the number of persons with tertiary education increased on average by 3% per year, with females registering the highest

growth. Those who completed a doctoral degree rose by 7% per year in the 1990s, with twice as many doctoral theses approved in 2001 as in 1991. Finland has specific targets for enrolments for different types and levels of tertiary education. In 2004, 25 000 places will be offered in the polytechnic institutes and 19 000 in universities, which is a significant increase on past enrolments. For 2008, the Ministry of Education is aiming for 15 000 masters degrees and 1 800 doctoral degrees granted in universities and 2 000 postgraduates enrolled in the polytechnic institutes (MOE, 2002*c*).

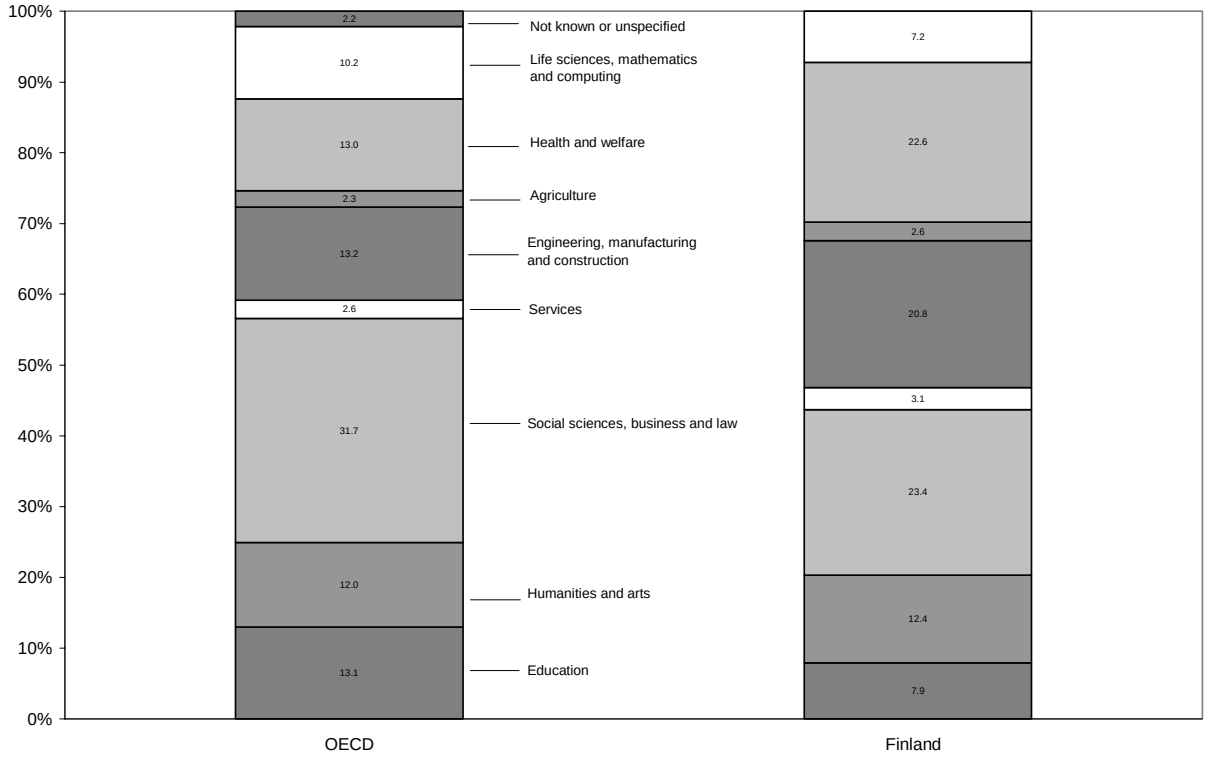
Figure 2. Growth in tertiary education, 1991-2001
(Percentage of the population of 25 to 34-year-olds that has attained tertiary education)



Notes: Includes tertiary type-A education, which corresponds to tertiary academic education (university), and tertiary type-B education, which corresponds to tertiary vocational education (practical/technical/occupationally-specific programmes).
Source: OECD (2003), Education at a Glance.

Finland's dual system of higher education has resulted in a profile of earned expertise somewhat different than the OECD average (**Figure 3**). Although they offer education in a wide range of fields, the prominent role of the polytechnic institutes has led to a higher share of graduates in engineering-related fields than in other OECD countries. The universities, with their large female enrolments, graduate a higher proportion of students specialised in areas such as health and welfare. The universities are also responsible for training teachers and others taking up public service. In 1999, over half of the previous year's university graduates worked for central and local government, while 75% of employed polytechnic graduates had jobs in the private sector. Polytechnic graduates were also more than twice as likely to become entrepreneurs (OECD, 2001*b*).

Figure 3. Higher education by field of study, 2001

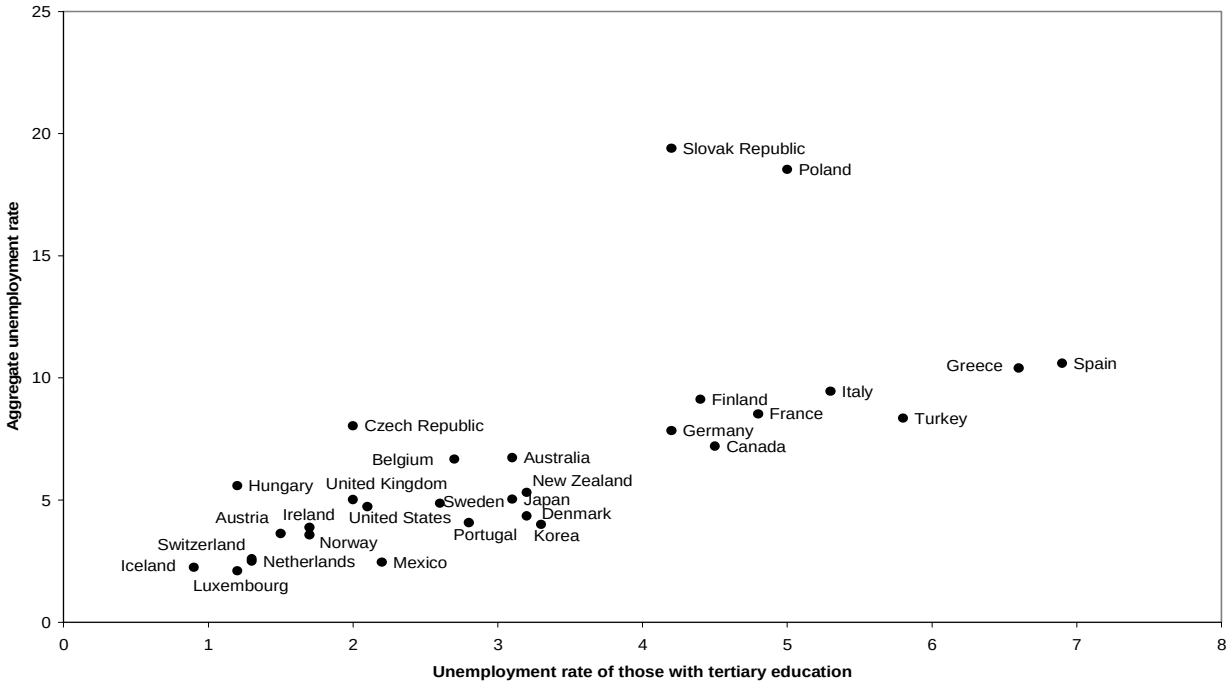


Source: OECD (2003), Education at a Glance.

In OECD comparisons, Finland has evidenced lower rates of return to higher education than the OECD average although higher than in other Nordic countries (Blondal *et. al*., 2002). This is generally due to the long duration of university studies. Since it is not compulsory to obtain an undergraduate Bachelor's degree, most university students are accepted directly into Master's degree programmes. The median time spent at university is thus six years, while the average age of an university graduate is 27 (MOE, 2001). Most polytechnic graduates obtain a degree in 3-4 years, with postgraduate polytechnic education now being offered on an experimental basis. Although attempts have been made to shorten the length of university studies, *e.g.* through reductions in the duration of financial aid, the time spent obtaining a university degree decreased by less than one year in the past decade. The Ministry of Education has recently issued an action plan to reduce the time taken to graduate and to increase completion rates (MOE, 2003).

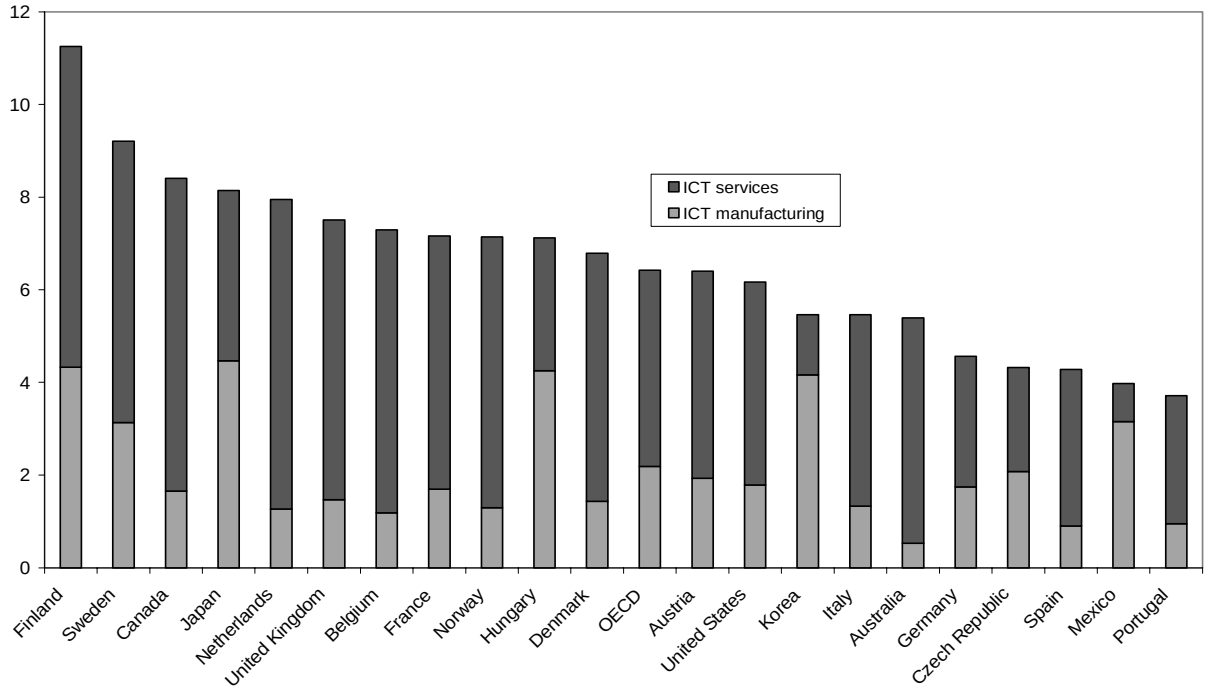
Although higher-skilled workers are more likely than the lower-skilled to find employment in Finland, the country still has a relatively high unemployment rate for those with tertiary education compared to other OECD countries (**Figure 4**). In 2001, about 25% of those employed in manufacturing and over 50% of those employed in the information and communications technology (ICT) sector held tertiary degrees. Finland has the highest share of employment in the ICT sector among OECD countries (**Figure 5**). Although ICT enterprises account for less than 7% of all firms in Finland, they play a prominent role in overall employment. In the late 1990s, more than one-third of new manufacturing jobs involved production of ICT goods, primarily communications equipment (mobile phones) followed by computers and electronic components. ICT services (programming, design, digital content, Internet) account for over 60% of employees in this sector, and this share is increasing due to declining equipment prices as technology advances.

Figure 4. Comparative unemployment rates in OECD countries, 2001



Notes: Unemployment rate of persons with tertiary education and total unemployment rate.
Source: OECD (2003), Employment Outlook.

Figure 5. Contribution of ICT sector to employment, 2000



Notes: Employment in information and communications technology (ICT) sector as share of total.
Source: OECD (2003), Science, Technology and Industry Scoreboard.

It is projected that the need for new labour will exceed the number of those entering the labour market by more than 20 000 people by 2010 (MOE, 2002*b*). Models indicate that demand for skilled labour will be highest in the information industry and other technology-based fields due to higher business R&D intensity and technology exports (Huttunen, 2002). According to Ministry of Labour projections, demand for engineering and special skills will be higher than for other professions (MOL, 2001). According to the information industry, demand for ICT workers in Finland will double by 2010, while demand for ICT skills will increase in other sectors as well (FFEEI, 2002).

Finland's population is predicted to age rapidly and earlier than in most other OECD countries (OECD, 2003*a*). The private sector is facing a diminishing skills base, particularly for high-technology industries such as the information sector. Producing a sufficient number of skilled workers and the right mix of skills for industry will not be done solely by raising overall educational attainment levels. There is a need to enhance both flexibility and mobility in the Finnish labour market to ensure that available skills will fulfill future private sector work work requirements.

POLICIES FOR DEVELOPING HIGHLY SKILLED WORKERS

Overview

In Finland, both males and females are among the most highly-educated in the OECD and engage in continuous education and training. The government has emphasised individual learning paths, particularly through a competence-based qualification system which accredits prior studies and recognises informal learning. Support in the form of a subsidised leave system is also provided as an incentive to business to help finance worker training costs. Rapid structural change towards technology-based sectors in the 1990s caused employers to increase upskilling as a matter of survival, and special assistance is given by the government to smaller enterprises. In Finland, co-operation between the social partners is balanced, with labour organisations very involved in adult education and training issues.

Despite these advantages, the ability of labour markets to adjust to needs for highly skilled workers may depend on further enhancing flexibility and workforce mobility. Addressing future needs for skilled workers in industry – including for researchers and those with ICT skills – will require increasing opportunities for public sector researchers, women and immigrants. The government has initiatives to improve occupational forecasting, reduce the length of university studies, raise the flexibility of training formats, increase public/private sector research linkages, attract foreign students, and boost female participation in the labour force. In addition, a comprehensive programme to increase levels of entrepreneurship was announced in 2004.

Monitoring supply and demand for highly skilled workers

There are several public and private entities in Finland which produce forecasts of labour market needs for highly skilled workers. Every three to four years, the Ministry of Labour issues a long-term forecast of Finland's economic performance and potential labour needs. The most recent, *Labour Force 2020*, predicts growing demand in technology-based sectors and recommends more adult training and gender equality in employment (MOL, 2003*a*). The regional Employment and Economic Development Centres (T&E Centres), which are managed by the Ministries of Labour, Trade and Industry, and Agriculture and Forestry, also prepare short-term prognoses of labour demand in their regions.

With regard to more specialised personnel, the *Science and Technology Policy Council of Finland* publishes triennial reviews which cover potential changes in the innovation environment and the needs of the research community for science and technology workers (STPC, 2003). Labour market forecasts are also produced by the Government Institute of Economic Research and the Labour Institute for Economic Research. In addition, the Ministry of Trade and Industry is developing a system for technology foresight which will follow the development of key technologies and their social impacts, including implications for the labour market.

On the supply side, the Ministry of Education produces regular prognoses of needs for education, partly based on the models and statistics of the Ministry of Labour. Every four years, a *Development Plan for Education Policy* is formulated, which includes decisions concerning fields of study and student numbers in individual educational institutions. A joint project, *Forecasting the Quantitative Needs of Vocational Education and Training and Higher Education*, was initiated in 2001 to acquire statistical and other information for forecasting educational needs to meet labour market demands (MOE, 2002*b*). Estimates

are based on the results of different calculation models and market research. In addition, there are Sectoral Committees which follow industrial and occupational changes and make recommendations for the development of vocational education.

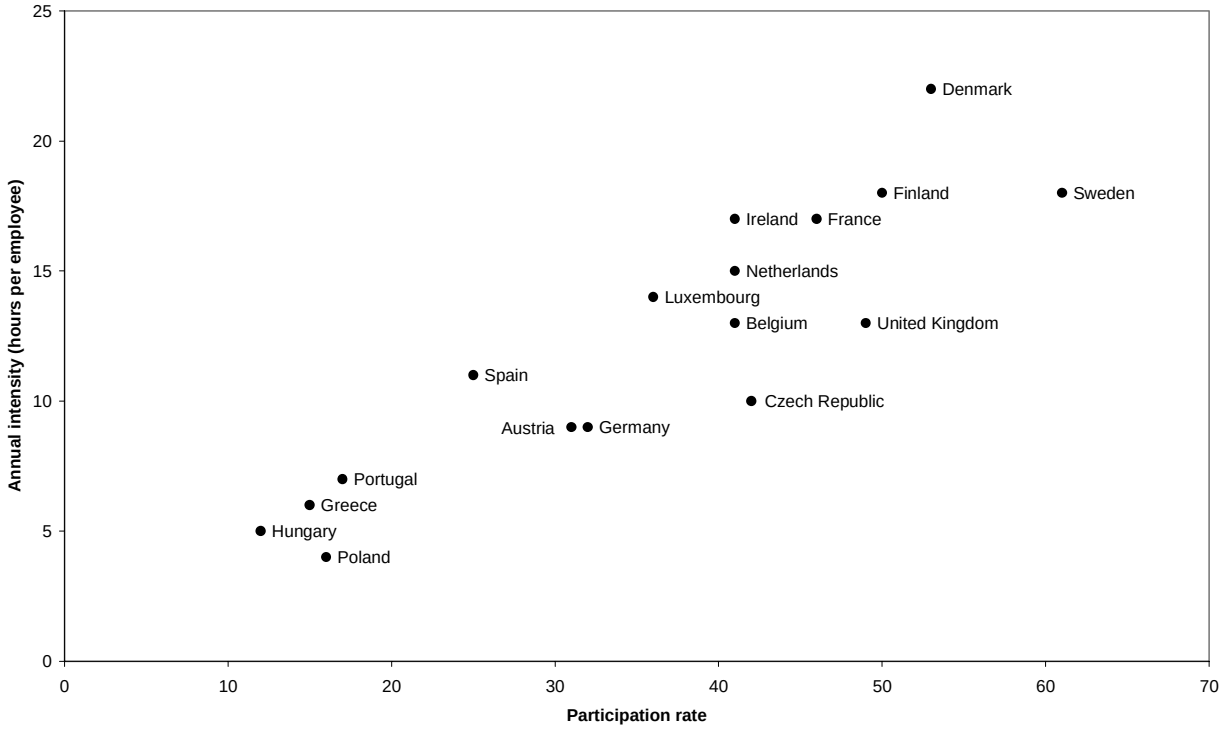
In the private sector, the Confederation of Finnish Industry and Employers (TT) produces forecasts of the needs for staff and competence in its member firms. Its latest effort (*A Competence-Intensive Finland 2012*) was developed from enterprise questionnaires -- the *Barometer of Qualification Needs*—and a group of 50 experts from different sectors. In addition to ICT workers, it highlights the need for more experts in biosciences, materials technology, and chemical and mechanical engineering (TT, 2003). Several research institutes such as the *Research Institute of the Finnish Economy* (ETLA) produce annual short-term forecasts and regular longer-term predictions concerning labour needs. Focusing on the information industry, the Federation of Finnish Electrical and Electronics Industry co-ordinated the *TIDE Project* to forecast future needs for ICT skills partly based on scenario-building. Due to predictions of heightened demand for ICT workers, recommendations were made for increasing student enrolment in ICT training and encouraging more women to take up ICT studies, with a goal of increasing the number of academic degrees in the information field by one-third between 1999 and 2006 (FFEEI, 2002).

In its overall strategy, the Education Ministry emphasises that "the matching of education and labour market needs will be improved by means of growing cooperation between education and training providers and business and industry"(MOE, 2002c). However, more co-operative efforts among public and private sector actors are needed in evaluating forecast results and the implications for quantitative and qualitative matches between educational attainment, placement of highly skilled workers and labour markets. The Confederation of Finnish Industry and Employers (TT) could take a more active role in intermediating knowledge from different sources and the implications for education and other government policies. To this end, the Ministry of Education is partially funding a TT project to develop a system for monitoring labour and qualification needs in line with the changing requirements of industry (TT, 2003). These efforts should be combined with joint efforts to more widely disseminate labour market information among students and workers.

Increasing enterprise and individual training

Finland is among those Nordic countries which have high rates of worker participation in training (**Figure 6**). According to the *Adult Education Survey 2000*, 70% of those in the labour force aged 18-64 with a tertiary degree had participated in job- or occupation-related training during the 12 months prior to the survey. Of these, 90% participated in training that was sponsored by their employer (SF, 2002). Finnish companies are very pro-training, particularly when it is job-related or vocational. These attitudes developed as training needs grew rapidly in the 1990s with vast structural changes in the economy and innovations within companies themselves. In addition, Finnish law requires that all companies submit annual training plans to joint enterprise committees and negotiate these with employee representatives. As in several European countries, participation in employer-sponsored training is significantly greater in Finnish firms which have joint arrangements with labour (OECD, 2003*d*). On average, 5% of a company's payroll is spent on training, up from 2% in 1993, with the highest relative expenditures by firms in telecommunications, transport and financial services (OECD, 2001*b*).

Figure 6. Comparative rates and intensity of worker training, 1999



Notes: Participation rate and annual intensity of employee-sponsored continuous vocational training (CVT) in European countries.
Source: OECD (2002), Employment Outlook.

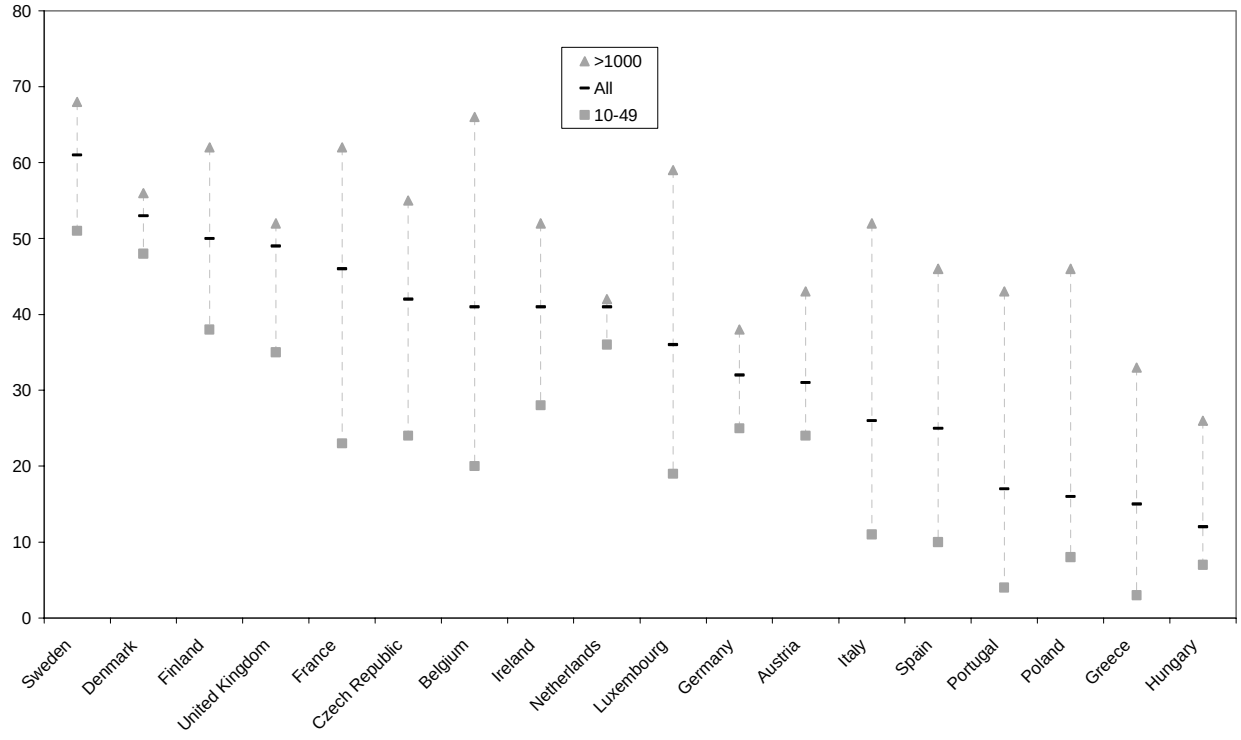
Finland has generally emphasised individual learning paths, taking steps to stimulate personal investments in training. In conjunction with labour groups and enterprises, the government has set up an Individual Learning Account (ILA) system where wages while on training are partially subsidised. An allowance is granted to employed adults who have been working for at least ten years, and who accrue the allowance at the rate of 0.8 days per work month, for studies lasting at least two months. Workers who receive this training leave subsidy can also be given financial assistance for post-graduate studies, consisting of grants, housing supplements and government guarantees for loans. At present, about 5 000 workers take training leave annually.

In order to provide formal recognition of skills and learning, a system of competence-based qualifications or "free exams" was introduced to credit adult skills independently of the way skills are acquired. Credits are not conditioned on course attendance in a vocational training or educational institution. Again, the social partners are heavily involved in the elaboration of the certification schemes through expert groups. This system has led to significant expansion in vocational adult education, which now accounts for two-thirds of all adult education. Courses are provided through *Open University* and *Open Polytechnic*, and credits earned are transferable to higher education degree programmes. The number of students enrolled in Open University increased from 39 000 in 1990 to 78 000 in 1999. However, there are still questions as to whether adult graduates with certified skills receive additional wage premiums or promotions and the degree to which these more informal qualifications are recognised by the labour market (OECD, 2001*b*).

In Finland, as in other OECD countries, participation in employer-sponsored training correlates directly with the size of the company. In firms with less than 50 employees, the training participation rate in Finland in 1999 was 38% compared to 68% in companies with 500 or more employees (**Figure 7**). The

vast majority of Finnish firms are considered small and medium-sized enterprises (SMEs), where the lack of managerial skills is considered a major obstacle to business growth.

Figure 7. Worker training by firm size, 1999
(Participation rate of employee-sponsored continuous vocational training (CVT) by firm size in European countries)



Source: OECD (2002), Employment Outlook.

Yet small firm employees in Finland are more likely to receive training than in other OECD countries. The 15 regional T&E Centres organise and help finance the education and training activities of companies, especially SMEs. Services include management training and courses for entrepreneurs, as well as courses in ICT, accounting and marketing. Most training and consultancy services are purchased from some 300-400 external experts. With subsidies of €24 million per year, close to 70 000 staff training days are implemented each year, mostly for firms with less than 10 employees. However, evaluations have suggested that the activities of the T&E Centres need to be made more enterprise-oriented, offering training courses that are tailor-made for specific sizes and types of enterprises. The polytechnic institutes, which are the main source of small firm workers, could play a larger role in increasing competence in SMEs, particularly in regions outside the growth centres (OECD, 2003*b*). According to the *Entrepreneurship Policy Programme,* announced by the Ministry of Education in 2004, links will be strengthened between the polytechnics and small firms in terms of management education and technology development.

Despite its effective training schemes and existing high training levels, Finland is adopting more innovative and flexible training approaches. Companies are being encouraged to use arrangements such as individual working time options, time pools and learning banks to overcome barriers to training participation caused by time constraints, family responsibilities and other trade-offs. Formal courses now account for 66% of training in manufacturing and 81% in services, which is believed by some to be too

high. Other forms of training, such as guidance on the job, job rotation (exchanges with other enterprises), workshops, mentoring, Internet courses and self-education are being promoted.

In order to assure training levels and relevance to industry needs, the government should maintain the budget for paid training leave (which is now under threat) as well as increase the range of training formats. In this respect, the most recent *Employment Contracts Act* has been criticised as impeding the implementation of flexible training provision due to rigid rules concerning employment contracts and working hours (SITRA, 2001*a*). According to Finland's 2003 *National Action Plan for Employment*, the Government is preparing a report to Parliament on trends in business and working life and ways in which employment legislation can better accommodate flexible work practices (MOL, 2003*b*). In addition to increasing the enterprise orientation of small firm training schemes, steps to enhance the flexibility of training formats should be accelerated.

Enhancing national worker mobility

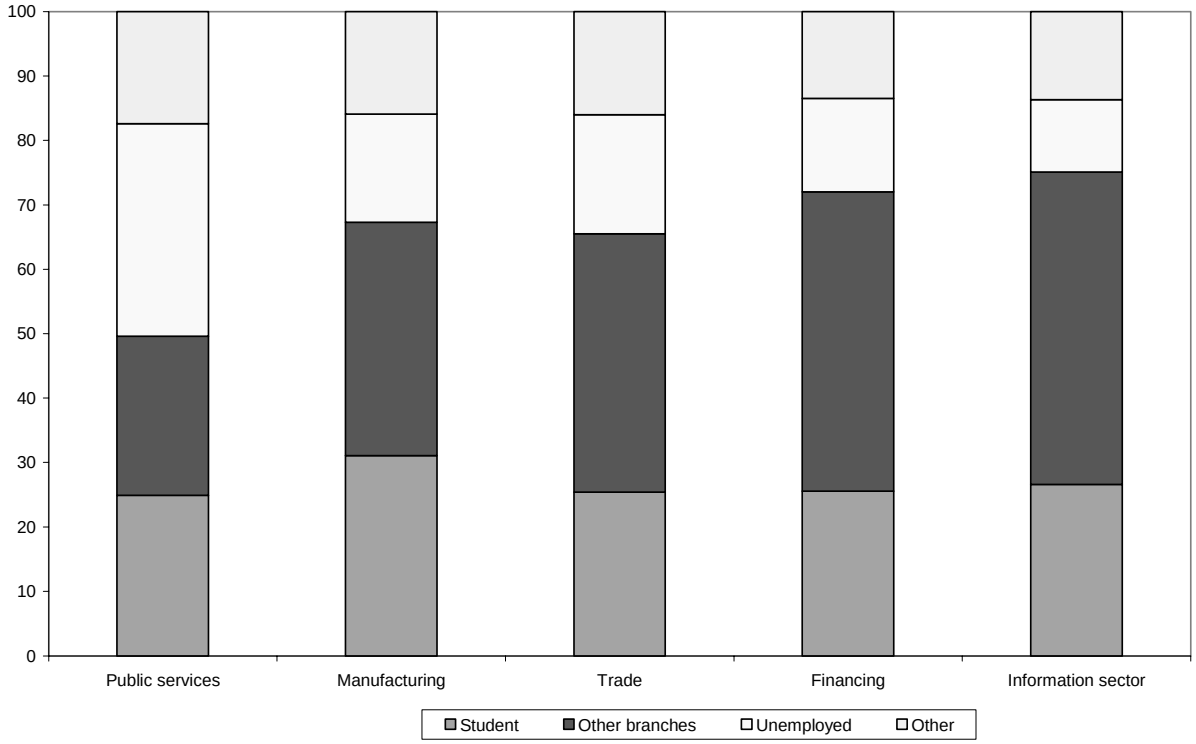
Despite relatively high levels of worker movements in recent years, there remain some barriers to mobility between industries as well as the public and private sectors in Finland. Like most countries, Finland has evidenced an inverse relationship between rates of unemployment and worker mobility, indicating the effects of business cycles on the movement of personnel. The mobility of highly-educated personnel increased during the 1990s as the recession ended and the information sector started its ascent. In 1998, nearly one-fourth of skilled workers changed jobs, compared to less than one-fifth in 1992. In 2001, job mobility was highest in the information sector (**Figure 8**). The mobility of workers between the ICT sector and other sectors has steadily increased with ICT companies acquiring 35 500 employees in 2001, nearly half of whom worked previously in other sectors. The lowest mobility rates have been evidenced in the manufacturing sector (SINTEF, 2003).

The centralised wage formation process may somewhat constrain worker mobility in the private sector. Close co-ordination with the social partners has contributed to the extensive training of workers in Finland. In addition, small open economies with a tradition of consensus and co-ordinated wage formulation (*e.g.* Finland, the Netherlands, Denmark, Austria) have tended to do well in recent years in terms of employment and growth. However, overly-rigid wage scales may prevent adjustments of wages to differences in demand and supply for skilled labour. More possibilities could be given for certain sectors, professions or small firms to opt out of collective wage agreements, so that differential pay scales could play a greater role in allocating skilled workers (OECD, 2003*a*).

The public sector is large in Finland relative to the OECD average. Government employment accounts for nearly a quarter of total employment with little change since 1990. The public sector has been criticised as sheltered from competition, resistant to outsourcing to the private sector, and somewhat inefficient at all levels (OECD, 2003*b*). In recent years, more government agencies have adopted business-type operations, public services have been outsourced and state-owned companies have been privatised. Still, more needs to be done in terms of reducing the size of the public sector, privatising assets and outsourcing government functions.

Schemes are also needed to promote mobility of skilled workers from the public sector to industry where labour needs may be more critical (OECD, 2003*a*). Skilled personnel in the public sector continue to be adverse to moving to the less-sheltered and more insecure work environment in industry. One aim of the *Entrepreneurship Policy Programme*, announced by the Ministry of Education in 2004, is to enhance the attractiveness of entrepreneurship and enterprise start-ups as a career. Increasing mobility in the private sector and between the public and private sectors will depend on greater privatisation and outsourcing to industry of government services as well as competitive wage structures.

Figure 8. Worker mobility in Finland, 2001
(Percentage of labour market entrants by sector and previous activity)



Source: Statistics Finland.

Adjusting to international worker mobility

Finland has relatively low migration rates of highly skilled workers into and out of the country. In 2002, there were about 100 000 immigrants in Finland or less than 2% of the population. Although rapid ageing will lead to shortages of skilled labour, immigration of trained workers is minimal largely due to language and integration difficulties. The government has been slow to develop integration measures in its immigration policies, although it is working on improved monitoring and immigrant services. Following legislation in 1999, immigrants became entitled to an integration plan over three years, which may include education, training and employment in industry. They also receive an allowance financed by the Ministry of Labour and the regional governments, provided they adhere to training plans (OECD, 2001*b*).

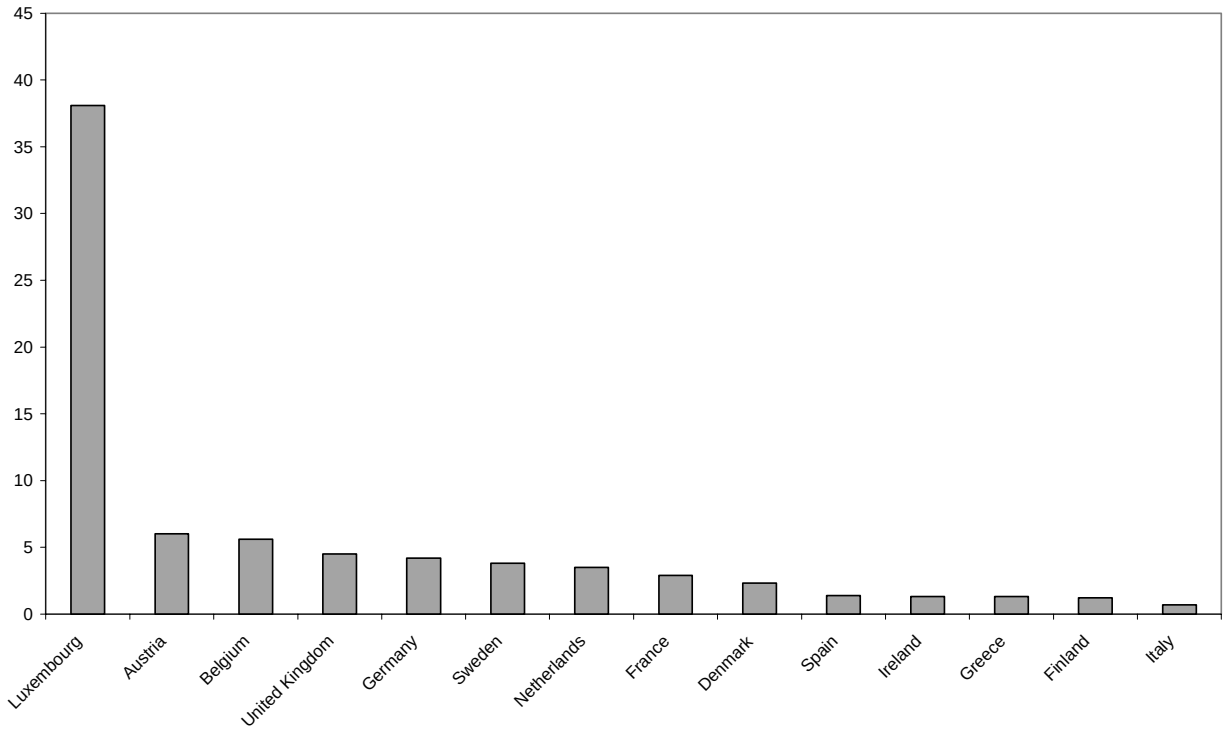
In order to address future skills shortages, the government needs to further develop adjustment and integration programmes for professional immigrants, which are about 25% of the total. This includes schemes to help them adapt to working life and develop language proficiency as well as provision of continuing or qualifying education. EU enlargement is expected to increase inflows of immigrants, including highly skilled workers. Finland will implement a transition period of applying national work permit practices to the citizens of the new member states for 2-7 years. Although the majority of work permits have been granted in the past, Finland will need to integrate work licensing provisions and enhanced integration programmes into its overall labour market policy.

High marginal tax rates (now around 56%) are also blamed for the failure to attract more highly skilled workers to Finland. In the past, inward migration of top-level professional workers has been encouraged through tax incentives. For two years and for income that exceeds €5 800 a month, foreign highly skilled experts are taxed at a lower income tax rate (35%). Although in force since 1999 and to be extended to

2007, this fiscal provision has been applicable to less than 200 people in recent years and is not considered to have had a great impact. The government has promised to review the tax issue and its effect on attracting foreign professionals.

Finland also has one of the lowest mobility rates in the European Union among more technical workers and thus has not been able to take advantage of foreign skilled labour through international research activities and other channels (**Figure 9**). The Academy of Finland has attempted to rectify this situation through international exchange agreements. In 2001, it allocated €3.7 million to researcher exchanges and research visits to foreign universities, leading to exchange agreements with 37 partners in 25 countries. In 2003, the Academy announced its intention to strengthen these efforts in connection with the implementation of the European Research Area.

Figure 9. Stocks of foreign high-skilled workers, 2002



Notes: Share of non-national human resources in science and technology (HRST) in overall HRST employment in European Union countries.
Source: OECD (2003), Science, Technology and Industry Scoreboard.

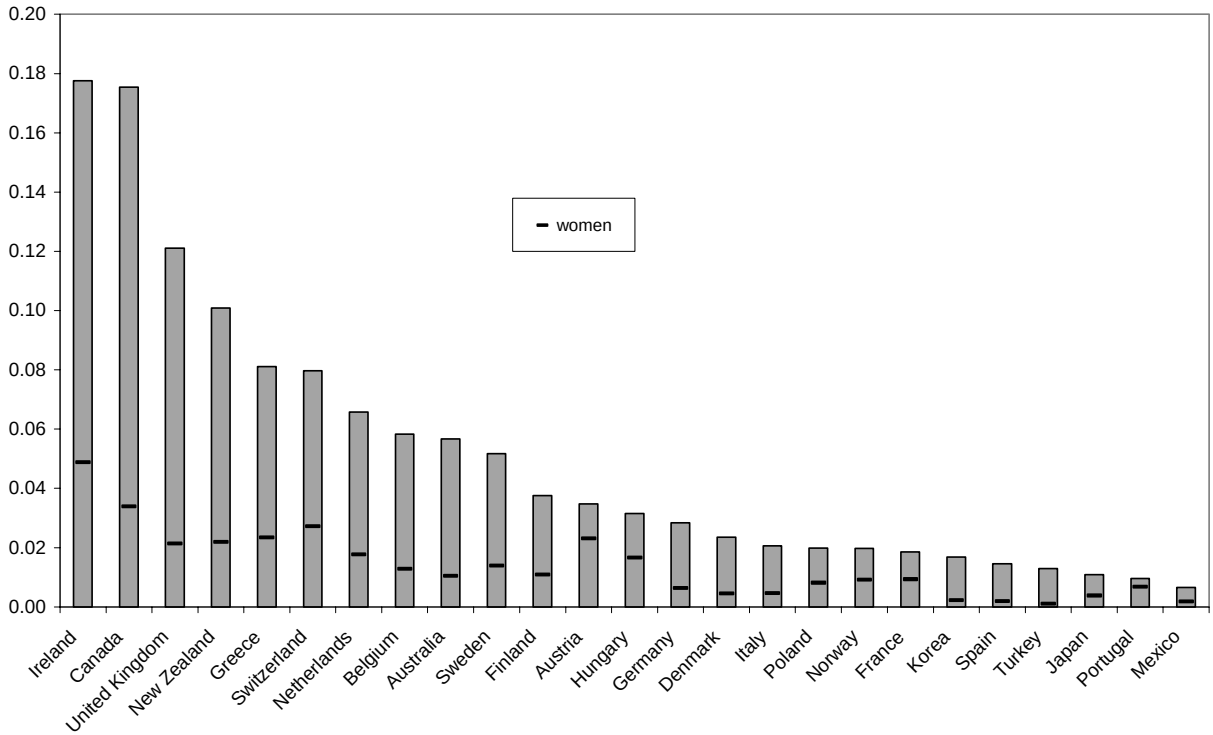
Finland has been more successful in attracting foreign students, which is one channel for increasing the availability of skilled labour. In late 2001, a national strategy for promoting further internationalisation of higher education was developed by the Ministry of Education with a goal of doubling the number of foreign students by the year 2010. In 2002, more than 6 000 exchange students studied in Finnish higher education institutions, about 60% in universities and 40% in the polytechnic institutes. The Centre for International Mobility (CIMO), which promotes study opportunities for foreigners, has extended 666 grants to foreign postgraduate students, mostly from Russia, Hungary and Estonia (CIMO, 2002).

These strategies for internationalisation of education have been criticised as insufficient and focused on a narrow range of academic issues and student exchanges (OECD, 2003*c*). In general, Finland needs to develop more educational content for international needs, increase English-language offerings, and achieve

greater involvement of the polytechnic institutes in programmes for foreign students. A step in the right direction is the adoption of a two-tier degree structure, planned for 2005, as part of the implementation of the Bologna Declaration (MOE, 2003). The universities, as well as the polytechnics, will have two cycles consisting of a three-year Bachelor's programme and a two-year Master's programme. In addition to increasing the international competitiveness and comparability of Finnish higher education, this may help decrease competition across the two types of institutions as well as shorten average study duration.

Finland also needs to take action to prevent a brain drain of students and skilled workers. There are now more Finnish students studying outside Finland than non-Finnish students studying in Finland. An increasing number of Finnish students as well as doctorates and researchers are being attracted to the United States (**Figure 10**). A recent European Commission survey found that only 13% of European science professionals working outside Europe currently intend to return home. In contrast to Finland and other European countries, the United States is seen as having the attractions of more competitive career and employment opportunities, less bureaucracy and better support for entrepreneurs (EC, 2003). In view of Finland's potential shortages of skilled personnel, steps are needed to increase the repatriation of Finnish students and workers, perhaps including financial and work-related incentives.

Figure 10. High-skilled foreign workers in the United States, 1999



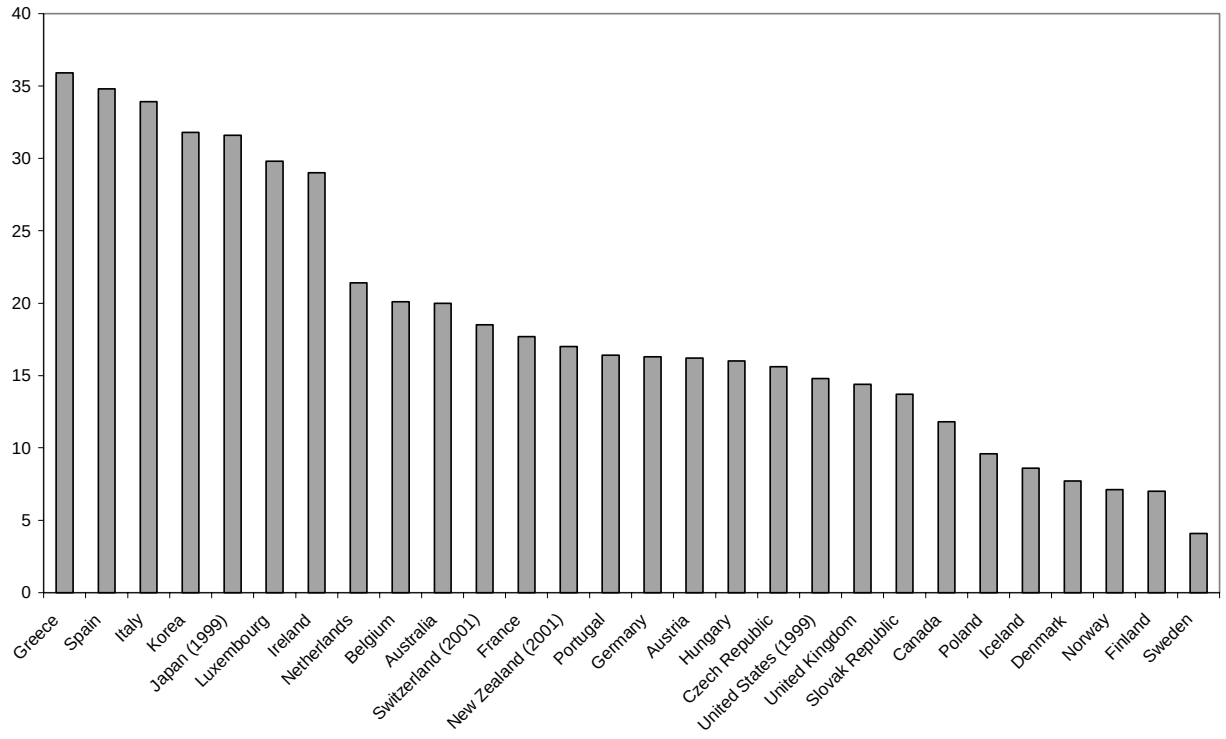
Notes: Non-US OECD citizens with science and engineering doctorates in the United States as % of source country's population.
Source: OECD (2003), Science, Technology and Industry Scoreboard.

Increasing workforce participation by highly skilled women

Finland has one of the lowest gender employment gaps for highly-educated women among OECD countries (**Figure 11**). This is due to the availability of full-time work, a high level of female educational attainment and programmes to reconcile work and family life. In addition, only 10% of employed women

work part-time, indicating a better utilisation of highly skilled labour than in most OECD countries. Despite the extensive workforce participation of highly skilled women in Finland, there is evidence of continuing gender differentiation in job opportunities and wages. There are concerns that women have not attained equality with men, and that their productivity potential has not yet been fully realised.

Figure 11. Gender employment gap for highly-educated women, 2000
(Percentage point difference between the employment rates for men and women with tertiary education)

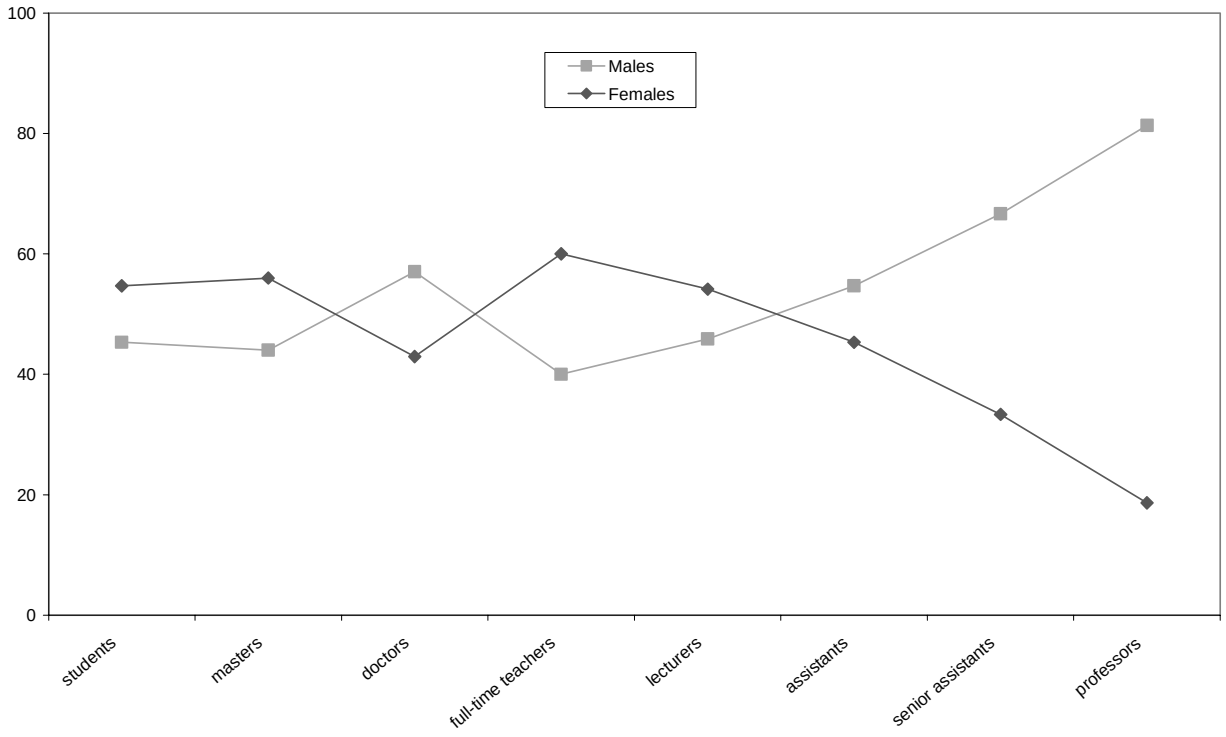


Source: OECD (2002), Employment Outlook.

The high share of women in the labour force and low gender employment gap in Finland can be partly accredited to family-friendly policies. All children under school age are entitled to subsidised childcare and to free pre-school, while mothers may take care leave until their child is three years old. Finland has the second highest (after France) paid leave entitlement for mothers among OECD countries (Jaumotte, 2003). Parental leave has been recently extended to allow fathers to take one-month absences for childcare under certain conditions, although this is easier for those in permanent employment. The tax structure in Finland also does not penalise families with two wage-earners.

The educational qualifications of female wage-earners tend to be higher than those of men in Finland, and women far outnumber men in many areas of adult education. The hierarchical differentiation between women and men has diminished over the past two decades, with women now in visible positions in all economic sectors. But although men and women are equally represented in the workforce, 75% of senior corporate positions are still held by men. Men also account for 60% of senior civil service positions. In the higher education sector, 82% of Finnish university professors are men even though women account for 45% of doctoral degrees (**Figure 12**).

Figure 12. Gender gap in higher education in Finland, 2000
(Women and men as share of total for different educational levels and professions)



Source: Statistics Finland.

Although the wage gap between skilled men and women workers narrowed in Finland during the 1980s, it widened again at the end of the 1990s. Top-level female professionals earn about 71% of the salaries of their male colleagues. This is partly due to salary negotiations through collective labour agreements, where increases have been marked in more male-dominated manufacturing sectors while female-dominated service industries have not benefited to the same extent from wage rises through collective agreements (OECD, 2002). Finnish labour agreements have occasionally included equality clauses as well as 'woman's pay' items for female-dominated fields of activity, but their effect has been more symbolic than pragmatic.

Although Finland has an *Act on Equality between Men and Women* which prohibits sexual discrimination in the workplace in terms of recruitment and pay, this has had no impact on the salary divide between men and women. The government should work with the social partners to ensure that the collective bargaining system does not penalise female workers in terms of wages or professions. Incentive pay systems based on job demand assessment could help reduce unfounded pay differences between equivalent jobs at sectoral and company levels. More needs to be done to address the wage gap, including monitoring the implementation of previous labour agreements (which contain female wage clauses) as well as legislation concerning gender equality. The government is setting up a *National Action Programme for Equality* (2004-2007) with the aim of eliminating unjustifiable pay gaps and raising equality in the workplace. For a start, this should review the effects of the collective wage bargaining system on skilled female workers and ensure the implementation of previous labour agreements on gender equality.

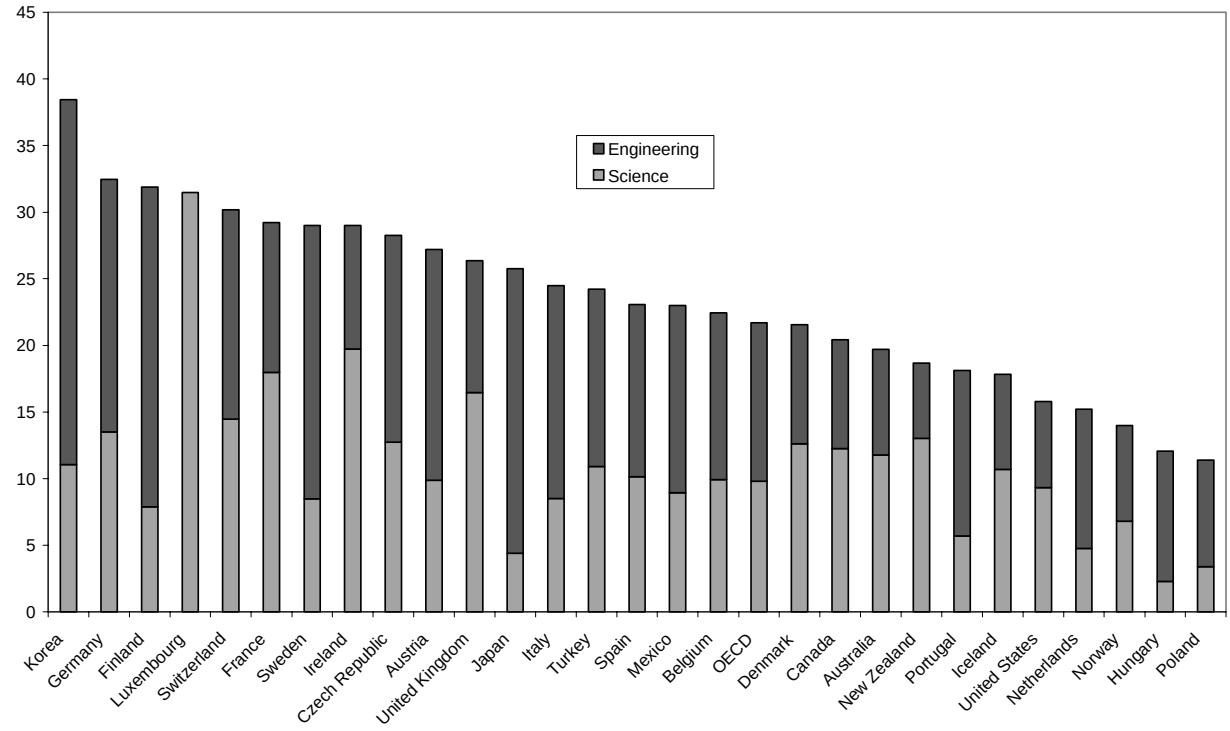
Developing human resources in science and technology

Finland has a high stock of human resources in science and technology, but barriers to mobility between the public and private sectors may impede efforts to fill predicted researcher shortages in industry. Public research funding is planned to increase by 20% between 2002 and 2007, which will add to demand for

technical personnel. Finland has a high level (over 30%) of technical graduates as a share of new degrees compared to other OECD countries (**Figure 13**). Engineering graduates from the polytechnic institutes tend to predominate. Finland has a relatively lower share of science graduates despite the fact that most research takes place in universities. In 2000, the universities had 20 000 research personnel compared to 470 researchers at the polytechnic institutes.

Finland evidenced a growth rate in the number of business researchers barely above the OECD average in 1991-2001. The earnings of researchers have risen more slowly than those of all salaried employees in industry, indicating the muted effects of wage signals in stimulating more HRST development. As emphasised at the Meeting of the OECD Committee on Scientific and Technological Policy at Ministerial level in January 2004, measures are needed to attract young people to science and research and to make it more appealing and attractive from the early stages of education onwards (OECD, 2004). This includes improving the quality of scientific teaching, encouraging individual creativity and expanding the participation of women and under-represented groups. Working conditions and career opportunities for researchers should be enhanced, especially at the beginning of professional life. These recommendations may particularly apply to Finland.

Figure 13. Science and engineering degrees as % of new degrees, 2000

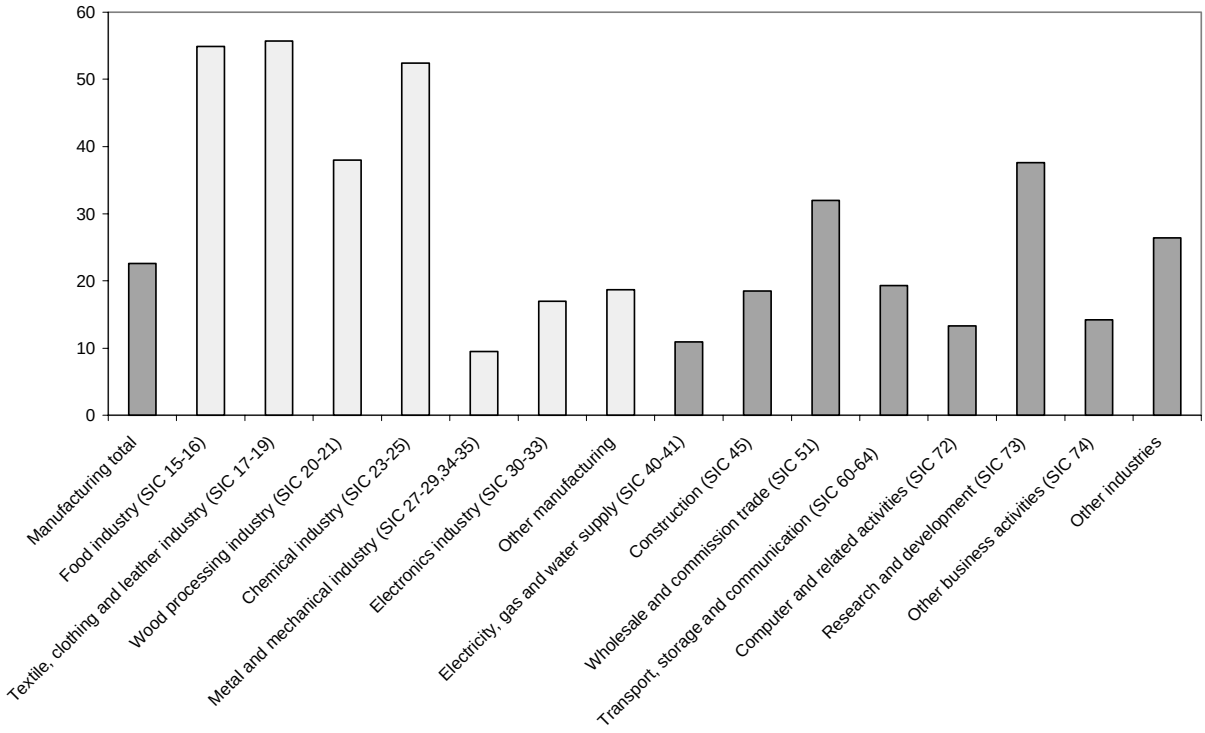


Source: OECD (2003), Science, Technology and Industry Scoreboard.

Despite female interest in more technical careers, Finland has been slow to increase the share of women science and technology professionals. The gender distribution between various fields of education has not become more equal, with men favouring engineering and technical studies compared to health, welfare and education careers for women. Although girls make up 60% of upper secondary students, only 30% of them choose advanced courses in mathematics compared to over 50% of the boys. In 2002, about 10% of women graduates had a technical education compared to 54% of men. As a result, women represent only about 22% of research personnel in business, mostly in chemicals, food and textiles (**Figure 14**). A

programme to raise the level of Finnish know-how in mathematics and natural sciences (LUMA) also aimed to increase the share of women in technological fields to over 30%, although this has not yet been achieved (MOE, 2002*a*). In addition, the Academy of Finland has an equality plan (2000-2003) including measures to promote female research careers.

Figure 14. Women researchers in business in Finland, 2002
(Female share (%) of R&D personnel by industrial sector)



Source: Finnish Science and Technology Information Service (2002).

While co-operation between research and industry is recognised as a strength of the Finnish innovation system, limited researcher mobility reflects the overall lack of personnel movement between government and industry. The somewhat negative attitudes towards entrepreneurship and business failure in Finland are one barrier to researchers moving from the public to the private sector. However, the new *Entrepreneurship Policy Programme* is intended to strengthen research flows between the public and private sectors, including through the creation of technology incubators. To improve links with business, the government will finance additional public/private research partnerships. In 2002, there were some 2 200 private sector personnel and 790 research institute personnel participating in these programmes. According to EU innovation surveys, 40% of innovative enterprises in Finland had contacts with higher education institutions compared to between 9% and 19% in other European countries (EC, 2003).

The government has also proposed legislative reforms to address issues of researcher mobility. Proposals are being presented to Parliament to promote more commercial exploitation of public research results and increase the number of spin-offs and start-ups from public activities. Enhanced services will be provided to researchers concerning intellectual property rights and commercialisation of know-how. There are efforts to promote more interdisciplinary education and research to encourage mobility across different sectors and fields. Students would have greater possibilities to combine fields of study from different institutions and more opportunities to gain practical experience in industry.

Finland has steadily increased the R&D capacity of the universities, including through a new graduate school system for research, the *Finnish Network for Higher Education Research and Training*, established in 2002 by the Ministry of Education. A total of €25-36 million was allocated to the schools, now numbering 114, and to funding more than 1 400 student researchers. In March 2004, recommendations were made to strengthen the research activities at the polytechnic institutes and to enhance the cross-fertilisation of the studies and research of polytechnics and universities. In addition to increasing R&D at the polytechnics, Finland should accelerate reforms to the public research system which would encourage more researchers to work and initiate businesses in the private sector.

REFERENCES

Blondal, S., S. Field and N. Girouard (2002), "Investment in Human Capital through Post-compulsory Education and Training: Selected Efficiency and Equity Aspects", *OECD Economics Department Working Papers*, No. 333.

Centre For International Mobility (CIMO) (2002), *International Mobility in Finnish Universities and Polytechnics*.

Confederation Of Finnish Industry And Employers (TT) (2003), *The TT Future Probe. A Competence-Intensive Finland 2012*

European Commission (2003), *Third European Report on Science and Technology Indicators*.

Federation Of Finnish Electrical And Electronics Industry (FFEEI) (2002), *Report of the TIDE Project: Anticipating the Knowledge and Skill Needs in the Information Industry and Digital Media*.

Foundation For Scientific And Industrial Research (SINTEF) (2003), *Mobility of Human Capital – the Nordic Countries 1988-1998,* Norwegian Institute of Technology.

Huttunen, K (2002), *Trade, Technology and Skill Structure of Labour Demand in Finland*.

Jaumotte, F. (2003), "Female Labour Force Participation: Past Trends and Main Determinants in OECD Countries", *OECD Economics Department Working Papers*, No. 376.

Ministry of Education (MOE) (1999), *Education, Training and Research in the Information Society. A National Strategy 2000-2004.*

Ministry of Education (MOE) (2000), *Education and Research 1999-2004: Development Plan*.

Ministry of Education (MOE) (2001), *An International Strategy for Higher Education*.

Ministry of Education (MOE) (2002*a*), *Final Report of the LUMA Programme.*

Ministry of Education (MOE) (2002*b*), *Forecasting the Quantitative Needs for Vocational Education and Training*.

MInistry Oo Education (MOE) (2002*c*), *Strategy Paper of the Ministry of Education 2002*.

Ministry of Education (MOE) (2003), *Report on the Finnish Implementation of the Bologna Declaration.*

Ministry of Labour (MOL) (2001), *Preparing for the Labour Market Change Caused by the Baby Boom Generation: The Final Report of the Project*, Labour Administration Publications.

Ministry of Labour (MOL) (2003*a*), *Labour Force 2020.*

Ministry of Labour (MOL) (2003*b*), *National Action Plan for Employment*.

OECD (1998), *The Financing of Lifelong Learning: Finland's Country Report*.

OECD (2001*a*), *Institutional Experiences of Quality Assessment in Higher Education – Discipline-based Evaluation in Finland*.

OECD (2001*b*), *Thematic Review of Adult Learning: Finland Country Note*.

OECD (2002), "Women at Work: Who are They and How are They Faring?" *OECD Employment Outlook 2002*.

OECD (2003*a*), *OECD Economic Surveys: Finland*.

OECD (2003*b*), *Regulatory Reform in Finland: A New Consensus for Change*.

OECD (2003*c*), *Review of National Policies for Education: Polytechnic Education in Finland.*

OECD (2003*d*), "Upgrading Workers' Skills and Competencies", *OECD 2003 Employment Outlook*.

OECD (2004), "Final Communique of the Meeting of the OECD Committee for Scientific and Technological Policy at Ministerial Level: Science, Technology and Innovation for the 21st Century".

Science And Technology Policy Council of Finland (STPC) (2003), *Knowledge, Innovation and Internationalisation.*

Statistics Finland (SF) (2002), *Adult Education Survey 2000*.

Finnish National Fund For Research and Development (SITRA) (2001*a*), *The New Work and Labour Law*.

Finnish National Fund For Research and Development (SITRA) (2001*b*), *Producing Competencies for the Learning Economy*.

Finnish National Fund For Research and Development (SITRA) (2001*c*), *Universities and R&D Networking in the Knowledge–Based Economy*.