

DEVELOPING HIGHLY SKILLED WORKERS:
REVIEW OF NORWAY



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

© OECD 2004.

Applications for permission to reproduce or translate all or part of this material should be made to:
OECD Publications, 2 rue André-Pascal, 75775 Paris Cedex 16, France.

DEVELOPING HIGHLY SKILLED WORKERS: REVIEW OF NORWAY

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 Norway 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 Norwegian 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 Susanne Dam Hoffmann (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.....	4
TRENDS IN SUPPLY AND DEMAND OF HIGHLY SKILLED WORKERS	6
POLICIES FOR DEVELOPING HIGHLY SKILLED WORKERS	10
Overview	10
Monitoring supply and demand for highly skilled workers	10
Increasing enterprise and individual training	11
Enhancing national worker mobility	14
Adjusting to international worker mobility	16
Increasing workforce participation by highly skilled women	18
Developing human resources in science and technology	20
REFERENCES	24

ASSESSMENT AND RECOMMENDATIONS

Norway has one of the most highly-educated workforces, both men and women, among OECD countries. The highly skilled enjoy almost full employment, and female participation in the labour force is extensive. However, Norway's economy is evolving from exploitation of offshore energy resources to more technology-based manufacturing and services in the mainland economy. Industrial restructuring, globalisation and technological advances are changing the skill requirements of the business sector. In addition to growing demand for high-skilled workers, forecasts specifically indicate potential shortages of engineers and researchers. Certain rigidities in the Norwegian economy may impede the production and allocation of skilled resources in line with business demand. A large public sector, extensive government involvement in the economy and a centralised wage formation system have led to weak wage signals, low worker mobility and structural problems in re-allocating resources across sectors.

Norway has implemented a number of reform programmes to address these problems, including the 2000 *Competence Reform* aimed at enhancing the provision of continuing education and training, the 2002 programme for *Modernising the Public Sector* which includes the introduction of performance-based management in government, and the 2003 *Quality Reform of Higher Education*, which is intended to increase the quality and efficiency of tertiary education. But more privatisation of industry and enhanced links between industry and academia are needed to preclude skill mismatches. Providing for the portability of pensions is key to greater mobility between the public and private sectors. Modifying wage negotiations by taking into account sectoral, skill and local conditions could enhance labour market flexibility and worker mobility. Additional steps may be needed to stimulate more full-time work by highly-qualified women, increase interest in scientific and technical fields, and take advantage of international flows of highly skilled labour. A summary of progress and recommendations concerning policies for highly skilled workers in Norway is given in **Table 1**.

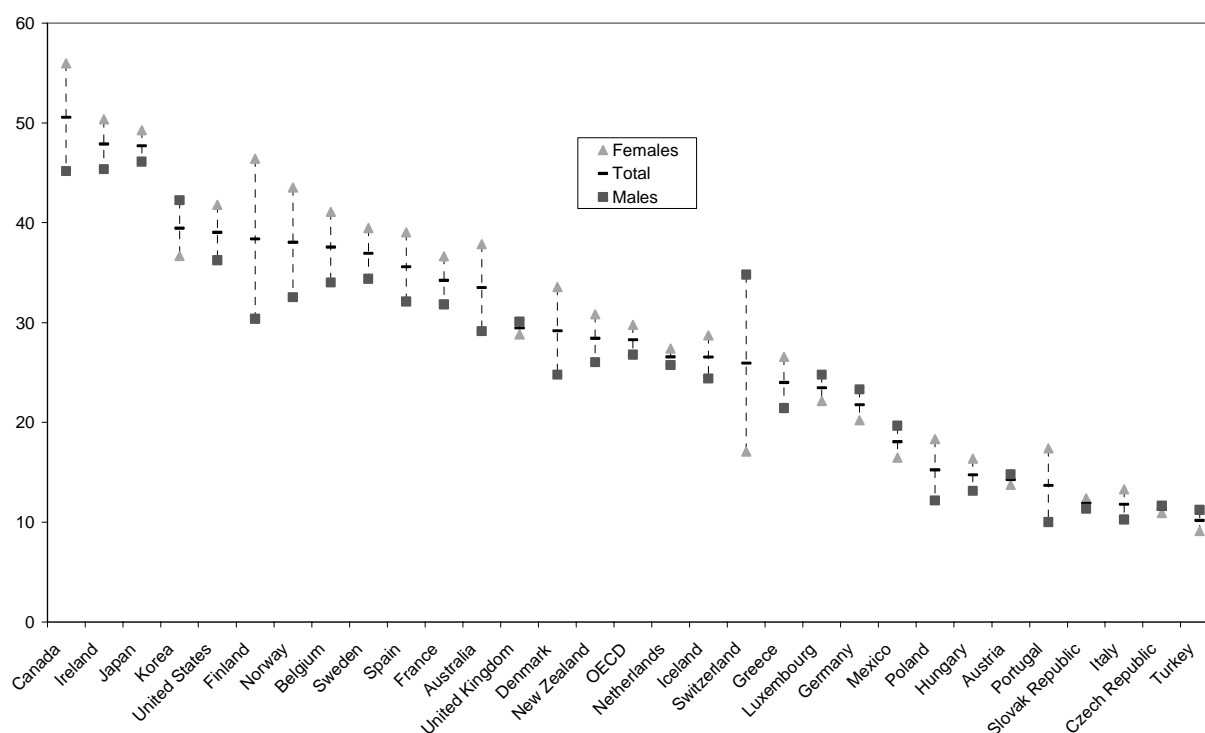
Table 1. Progress and recommendations

Area	Recent/planned action	Recommendations
Monitoring supply and demand of the highly skilled	Public Employment Service (PES) and Statistics Norway produces short-term and long-term forecasts of supply and demand for highly skilled labour.	Enhance co-ordination between public and private actors in forecasting skill needs and ensure wide dissemination of results.
Measures to increase enterprise and individual training	Legalised training leave for individuals and special training schemes for SMEs.	Establish competence-based exams to recognise non-formal learning for employment purposes.
Measures to increase national worker mobility	Proposals from <i>Pension Commission</i> and a new <i>Working Environment, Working Time and Employment Protection Act</i> to harmonise rules across the public and private sectors.	Partially disaggregate the centralised wage negotiation system to improve wage signals and accelerate reforms to harmonise rules for public and private workers and increase the portability of pensions.
Measures to adjust to international worker mobility	Liberalised immigration rules for high-skilled workers and initiatives to improve international mobility of students.	Implement programmes to attract and more fully integrate foreign high-skilled workers in diverse fields.
Measures to increase workforce participation by highly skilled women	Generous parental leave and childcare arrangements.	Increase full-time work among highly-qualified females by addressing wage and occupation gaps.
Measures to develop human resources in science and technology (HRST)	New <i>Innovation Policy</i> to increase R&D spending and HRST; <i>Natural sciences, of course!</i> and <i>RENATE</i> schemes to increase overall and female interest in science and technology.	Accelerate pension reform to enhance mobility of researchers and take more steps to enhance science and technology education at all levels.

TRENDS IN SUPPLY AND DEMAND OF HIGHLY SKILLED WORKERS

Norway has the highest share of individuals with advanced education among OECD countries, with 28% of the 25-34 year-old population holding tertiary-type A or advanced university degrees (OECD, 2003a). When tertiary-type B vocational education is included, Norway is no longer the leader but is still among the best performing countries in the OECD (**Figure 1**). The higher education system consists of 4 universities, 6 specialised university institutions, 2 national institutes of the arts and 26 state university colleges in the various regions of Norway, all of which are government-run. There are also a few private specialised university institutions. During the 1990s, tertiary educational attainment in Norway was among the fastest growing in the OECD (**Figure 2**). Norwegian universities, which have free admission, have the capacity to educate more than half of secondary graduates each year and over 60% of the population enters tertiary-type A programmes during their lifetimes (Næss, 2000).

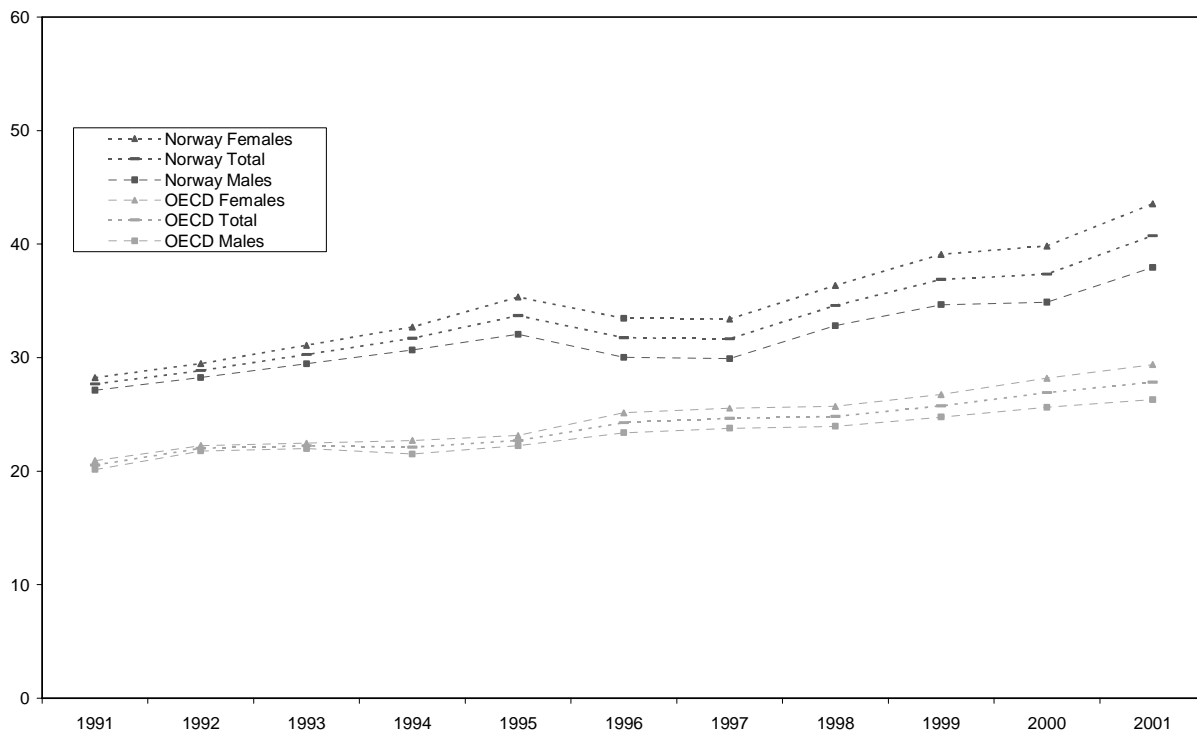
Figure 1. Educational attainment in OECD countries, 2001
(Percentage of the population of 25 to 34-year-olds with tertiary education)



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.

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.

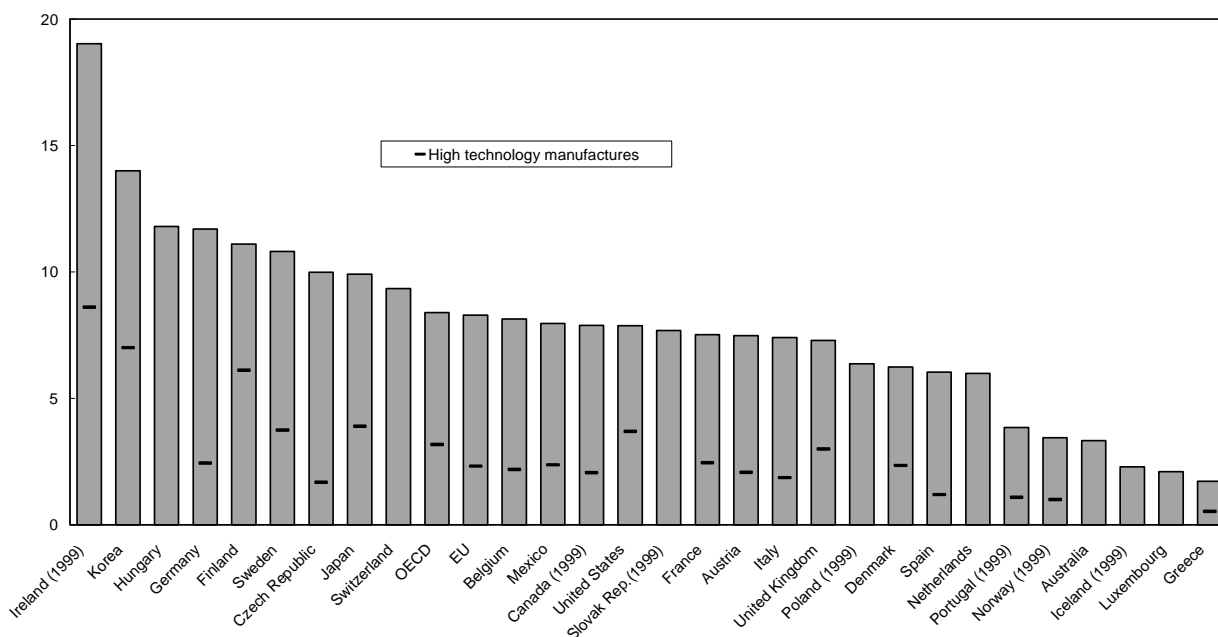
OECD reviews of the Norwegian higher education system have generally given it high marks, but have noted problems regarding low social and private rates of return and inadequate links between tertiary education and the labour market (OECD, 2000; OECD, 2002a). Despite extensive government investment in education, performance in international comparisons has been disappointing compared with the high amount of spending per student. In addition, there are signs that high educational attainment rates may be leading to an overall surplus in the supply of educated labour, while industry may face shortages of certain technical skills. The OECD has recommended that the government shift its emphasis from a supply-driven to a demand-driven model in its shaping of the education system and that it give more autonomy to both institutions and students in the choice of offerings and fields of study (OECD, 2002a).

In OECD comparisons, Norway has also evidenced low private rates of return to higher education generally due to the long duration of university studies (Blondal *et.al.*, 2002). The average age of students that enter tertiary education is high, and more than 20% of graduates are 27 years or older. They tend to stay at university longer than in most other OECD countries, partly due to the emphasis placed on obtaining Master's rather than Bachelor's degrees. Starting with the 2003/2004 academic year, the government introduced a *Quality Reform of Higher Education* programme. Among other things, the reform implements a new degree structure consisting of a Bachelor's degree after three years of study, a Master's degree after two more years of study, and a PhD after a further three years at university. The new structure effectively reduces the duration of tertiary studies by one year. The reforms also made part of the student financial aid package conditional upon timely course completion.

The *Quality Reform of Higher Education* also introduced a performance-based financing system and increased autonomy for the academic sector in the management and organisation of its activities. Funding will be based partly on performance in teaching and research, and institutional resources will be conditional on the number of students or degrees passed. An independent body, the *Norwegian Agency for Quality Assurance in Education* (NOKUT), was created to monitor and assess the quality of programmes and institutions and was given accreditation powers for all higher education in Norway. While these reforms are expected to enhance the quality of teaching and research in Norway, it is unclear that they will foster closer links with industry and greater responsiveness to the skills and competencies required in the labour market.

The Norwegian economy has traditionally been based on exploitation of natural resources and, while the offshore energy sector is based on high-technology and skilled human capital, it has not had high staffing levels. While contributing 25% of value-added, the energy and resources sector has accounted for only about 1% of employment. The dominance of oil and gas in the economy has created a dual industrial structure, consisting of the offshore energy sector and the mainland economy. Sea-based activities (fishing, shipping and shipbuilding) are important, while the manufacturing sector is relatively small compared to most OECD countries. Technology-based manufactures account for less than 5% of total value-added (**Figure 3**). Exports are generally energy-intensive manufacturing and engineering, including shipbuilding and offshore platform construction. The development of new industries based on information and communications technologies (ICT) has thus far been relatively modest. However, knowledge-intensive services, including telecommunications and finance, now account for about 20% of value-added.

Figure 3. Share of total value-added for high- and medium-high technology manufactures, 2000

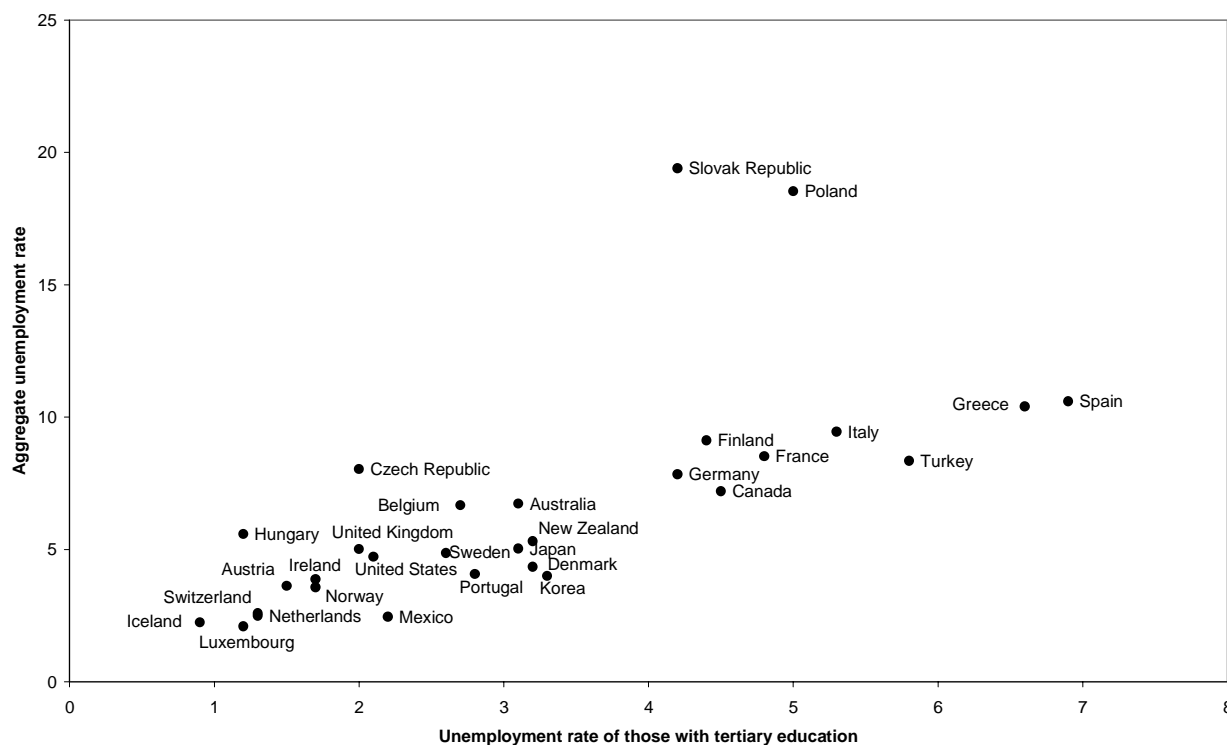


Source: STI Scoreboard 2003.

Norway's qualified workforce is almost fully employed; the overall unemployment rate in the economy is generally twice as high as that for people with tertiary education (**Figure 4**). In 2002, the share of tertiary-level graduates in total employment was approximately 30%, divided equally among males and females. However, the sectoral shift from manufacturing to services has accelerated in recent years, with about 76% of Norwegians now employed by the service sector, primarily business services, education, health and

social services. Due to industry restructuring, technological change and international trade which has led to higher-technology exports, demand for white-collar workers and higher educational groups is increasing. In the 1980s and 1990s, there were positive net job creation rates for medium and high-skill workers and negative ones for low-skill workers, a trend which is expected to intensify (Salvanes and Førre, 2003). Most medium-term scenarios for the Norwegian labour market show a significant increase in relative demand for high-skilled labour in the short-to-medium term (Bjornstad *et.al.*, 2002).

Figure 4. Comparative unemployment rates in OECD countries, 2001



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

Norway has had strong economic performance over the last decade based largely on exploitation of its oil wealth. In the longer-term, the importance of the off-shore sector will decline as oil reserves are depleted, and future growth will rely on the mainland economy. The large degree of government ownership in a number of industries (*e.g.*, retailing, air transport, financial services, oil, manufacturing, forestry, mining) has led to weak innovative activity in the past. Productivity growth in both manufacturing and services has been lower than in other OECD countries, due partly to high foreign trade and investment barriers and extensive economic regulation (OECD, 2004). However, as government reforms are implemented and more innovative technology-based activities and sectors are developed, industry will require a new mix of skilled workers. In the future, the dynamic development of new product markets will depend on flexible resource reallocations across sectors and a well-functioning labour market.

POLICIES FOR DEVELOPING HIGHLY SKILLED WORKERS

Overview

Norway has initiated a number of high profile reforms in recent years to address recognised weaknesses in its governance and economic systems (OECD, 2003b). The 2000 *Competence Reform*, a four-year plan of action developed in close co-operation with the social partners, aims at providing differentiated opportunities for continuing education and training provided by both public and private institutions. It encompasses the existing tax exemption for enterprise training expenditures as well as the right to study leave for workers, an ICT-based network of on-line training opportunities, and an innovative scheme for developing new training services and formats, especially geared to smaller firms. The 2002 programme for *Modernising the Public Sector in Norway* includes an action plan to introduce performance-based management in government and reduce state ownership or involvement in a number of activities. The 2003 *Quality Reform of Higher Education* is intended to improve the quality and efficiency of tertiary education and increase overall rates of return.

These programmes are too new to have yet delivered concrete results, particularly in terms of enhancing the environment for the supply and use of highly skilled workers. But more than is planned may be needed to increase flexibility in the economy and labour market and to achieve a better allocation of human resources between and within the private and public sectors. Highly skilled labour, particularly engineers, scientists, researchers and technical personnel, are required to support the further development of the mainland economy. This may depend on policies for increasing the ability of the education system to respond to market signals, enhancing worker mobility, fostering the fuller participation of women in the labour force, developing more scientific and technical personnel as well as attracting more high-skilled labour from abroad.

Monitoring supply and demand for highly skilled workers

Norway has a highly-centralised process for monitoring supply and demand for skilled workers, with a focus on public sector rather than private sector needs. The *Public Employment Service* (PES) (*Aetat*), which falls under the jurisdiction of the Ministry of Labour and Government Administration (AAD), monitors unemployment trends according to *e.g.*, occupation, sector, skill levels and regions. In addition, PES and Statistics Norway forecast demand for highly skilled labour. Short-term demand is elaborated from company surveys as well as employment and unemployment statistics from Statistics Norway (SSB). Long-term forecasts are based on a retrospective model (AD-MOD), which groups calculations from the macro-economic model MOSART (predicting employment demand by sector) and the micro-simulation model MODAG (predicting employment demand by academic field and demographic characteristics). The AD-MOD model compares demand for educational categories with inflows of labour in the attempt to see where mismatches are most likely to occur.

For public sectors including education, health and welfare, a more detailed planning tool has been developed to survey future needs and assure relevant supply of personnel. Political preferences and priorities play a major role in determining supply and demand of various types of labour in the public sector, and the results from the public sector models are not necessarily consistent with labour developments in the overall economy. As the structural evolution of the economy alters the desired skills profile of the labour force, particularly in the private sector, better and more transparent methodologies are

required to decide how the competence needs in the business sector should be defined. The social partners – including the *Confederation of Norwegian Business and Industry* (NHO) and the *Norwegian Confederation of Trade Unions* (LO) – should be more fully involved in collectively forecasting future labour needs.

If the recent increase in demand for skilled labour continues in Norway, it might not be matched by a corresponding rise in the right mix of skills due to certain rigidities in the economy relating to the extensive government role and an inflexible wage structure. High educational attainment rates have not necessarily led to the skills demanded by industry, where an updating and diversification of qualifications may be needed. PES forecasts a deficit of engineers in the period 2003-2010, while national targets for increased R&D spending could well lead to shortages of researchers. Policy reforms will be needed to enable the education system and labour market to adjust to changing skill requirements.

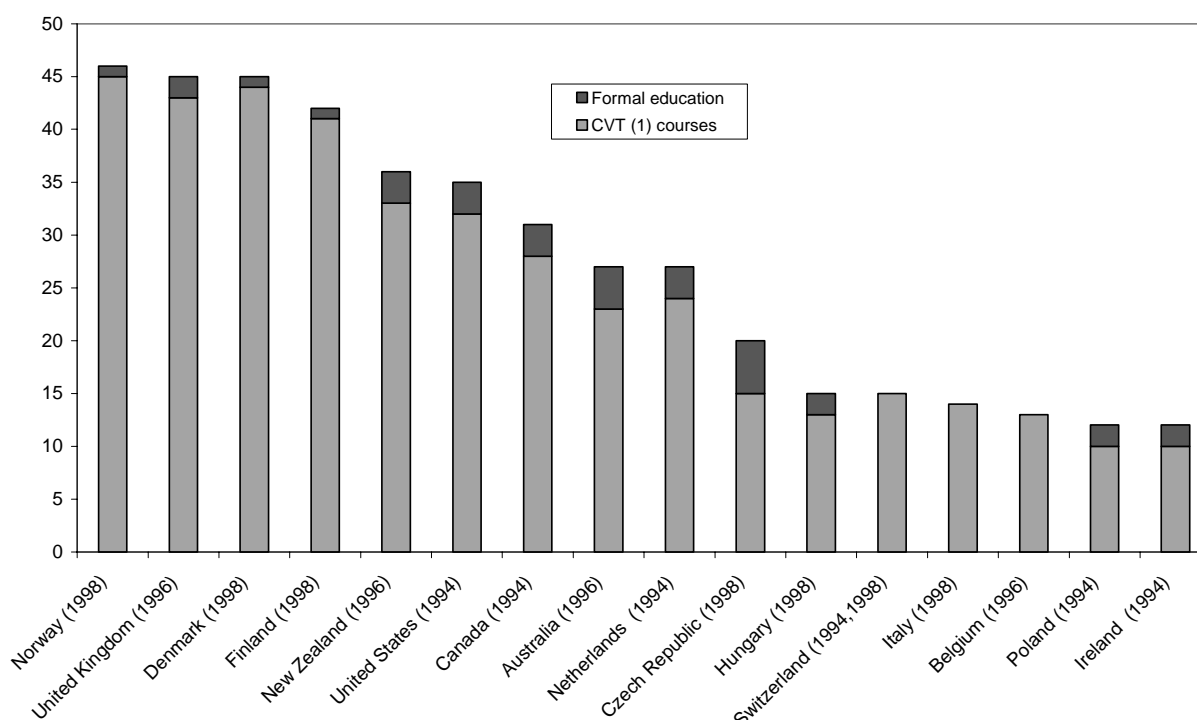
Apart from the public sector, labour market forecasts are currently not used in planning or influencing capacity within higher education for particular fields of study. This compounds problems stemming from low wage elasticity with respect to skilled professions in Norway. Weak market signals and the lack of communication between industry and the academic sector increase the possibilities for skill mismatches among the highly-educated. There is insufficient dissemination of information regarding trends in demand for worker skills, particularly for prospective students and graduates. In addition to more public/private co-operation in predicting market trends and skill gaps, schemes are needed which amplify existing market signals and disseminate forecasts to guide students in their choice of study and workers in upgrading their skills.

Increasing enterprise and individual training

Norway is among those Nordic countries which have high levels of expenditures and participation rates in worker training. Among European countries, Norway has the second highest participation rate in job-related continuing education and training (44%) (**Figure 5**). This is divided almost equally between women and men. The average amount spent on employee training was 1.7% of the Norwegian private wage bill in 1999 with 86% of enterprises providing training (Eurostat, 2002). In 2003, surveys show that over 67% of highly skilled employees participated in informal job-related training (*e.g.* courses, conferences) while 18% participated in more formal training activities (FAFO, 2004). With regard to sectors, energy and resources evidenced the highest training participation rates followed by public administration, health, education and welfare. At present, the government is emphasising more targeted measures to increase training for low-skilled workers.

Most worker training in Norway - about 85% - is paid for by employers with an emphasis on continuing vocational training (CVT) rather than more formal courses. Norway has a long tradition of close co-operation with the social partners, including the NHO and LO, who are important actors in adult learning. The amount of time spent participating in courses is far higher in Norway (about 78 hours per year per worker) than in other OECD countries. Many workers voluntarily participate in training since it occurs during working hours, although 33% of workers surveyed said their employers instructed them to undertake training. Among those with tertiary education, 70% thought the level of job-related training in Norway is sufficient or too high, compared to 30% who thought there is too little (SSB, 2003b).

Figure 5. Employer-sponsored education and training, 1998 or latest year
(Percentage of employed persons participating in training in total employment)



Notes: (1) Continuous vocational training.
Source: OECD Employment Outlook 2003.

Norway has an array of policy instruments to support worker training, the overall approach to which was enhanced through the *Competence Reform* initiated in 2000 (KUF, 2002). Through the *1999 Tax Act*, employers receive an immediate deduction for training costs, including the training itself, graduation fees, travel expenditures, books and other materials. The employee must have worked full-time for the firm one year and can receive a maximum of twenty months of full-time study, with proportional allocations for part-time workers. The training must either be related to the employee's competence in a current or future job at the same firm or be internally arranged by the employer. However, training that enhances skills and the ability to find other employment in the case of dismissal is also eligible. Norway considered but rejected proposals for further training tax incentives (above the 100% deduction) on the basis that this would violate principles of tax neutrality and be costly as well as difficult to target to appropriate groups. In general, such tax incentives can modify the marginal cost of training for enterprises and raise employers' supply towards the socially optimal level (OECD, 2003c).

In order to stimulate individual investments in training, a legal amendment was adopted in 2001 giving workers the right to study leave. Employees who have been working for at least three years, and for the same employer for the last two years, have a right to a full-time or part-time leave of absence of up to three years to participate in work-related education and training. The payment of wages while on study leave is to be negotiated with employers, and the right to such leave can be denied if a firm is undergoing major production or organisational changes. A tripartite committee, including the NHO, LO and the government, considered various options for financing the training leave, including co-financing by firms and employees and individual savings arrangements with tax incentives. The failure to resolve the issue of financial support during training leave has somewhat limited its take-up by workers (Butler, 2001). However, the

government considers that public investments in study leave would not yield significant benefits in terms of increased training levels, which are already high.

Norway also has an effective database on potential sources of training for enterprises and individuals. The *Norwegian University Network for Lifelong Training (Norgesuniversitet)* was developed in 2000 by the Norwegian Council of Universities and State Colleges in co-operation with the social partners and became a national agency under the jurisdiction of the Ministry of Education and Research in 2004. It provides a database or search engine containing information on several thousand training courses and a marketplace where firms and agencies can find assistance in developing new courses or training schemes. The database includes a wide variety of training, ranging from short seminars to Master's degree programmes to module-based add-on courses and Internet-based instruction. Businesses can post requests in the marketplace for tailor-made courses with specific time and cost limits. *Norgesuniversitetet* has been shown to be an effective and innovative information tool with regard to training, although it is generally of more use to individuals than to enterprises owing to the academic nature and longer duration of most courses (Ure and Skule, 2003).

Small and medium-sized enterprises (SMEs) in Norway account for more than 62% of employment and about 54% of economic turnover. Unlike in some other OECD countries, their training levels are relatively high compared to larger enterprises. Surveys show that 84% of small firms (10-49 employees) offer training compared to 96% of medium-sized firms (50-249 employees) and 100% of large firms (above 250 employees) (Eurostat, 2002). In addition, about 81% of workers in small firms are compensated for training compared to 96% in larger enterprises. In Norway, the training gap pertains to the smallest firms, or those with less than 10 employees. To this end, a number of special initiatives have been mounted to encourage and assist smaller enterprises in worker training.

The *Competence Reform* specifies that training projects should take into consideration the needs of small firms and, to this end, a *Competence Building Programme (Kompetanseutviklingsprogrammet)* was initiated under the auspices of the Norwegian Institute for Adult Education (VOX) to develop the market for training by means of development contracts for innovative projects. Funding – NOK 310 million for 1999-2004 and a further NOK 40 million in 2004 – can be sought by enterprises, municipalities, consortia of firms, industry associations, trade unions and other entities. One aim is to develop appropriate training programmes for small firms and to increase their capacity to procure such courses in the marketplace. Another goal is to improve co-ordination between the demand and supply sides of the training market. An interim evaluation – with 600 projects completed -- shows that the programme has enhanced the supply of training services, including those which are better adapted to small enterprise needs, and created networks which have improved collaboration and dialogue between firms, trainers and employees. In particular, close co-operation among the social partners has contributed greatly to success on the supply-side. However, the programme has been less effective in stimulating demand due in part to the low influence of the largest trade union on competence-building at firm level (Døving, *et. al*, 2003).

Innovation Norway - a new government entity which in 2004 replaced the Industrial and Regional Development Fund (SND), Norwegian Tourist Board, Norwegian Trade Council and Public Information Services for Inventors (SVO) – has assumed responsibility for two training programmes targeted to SMEs – *FRAM* and *BIT*. *FRAM* helps develop strategic managerial skills in small firms with an emphasis on innovation, knowledge management, networking and internationalisation. Approximately 300-400 Norwegian companies participate in the training programmes each year. A pilot programme, *FRAM-E*, is offered to start-ups which are based on special expertise, innovation or technology. An evaluation in 2002 found that 80% of participants improved their profitability by 5% or more of their total turnover during a 15-month period (SND, 2002). Since 1997, the *BIT* programme has aimed to increase ICT skills in small firms and enhance their use of electronic commerce. More than 2 700 small firms, including 80% of SMEs in certain technology sectors, have participated in BIT training and have implemented BIT solutions. Small

firms are also encouraged to link up through a BIT networking arena where they can share know-how on implementation, tools and good practices related to information technology.

In addition, the *State Educational Loan Fund* was recently modified to provide more generous financial assistance for adult education and training. Changes included an increase in the monthly income that can be earned by individuals without reductions in financial assistance and higher limits for the means-testing of family supplements for children on the basis of the income of a spouse or cohabiting partner. Despite these provisions, non employer-sponsored training is limited in Norway. Workers are reluctant to invest in training that is not paid for by employers. The *Competence Reform* recommended that a system for documenting and evaluating non-formal learning and acquired skills be established. A system has been set up for students above the age of 25 to enter universities based on non-formal learning, but the number taking advantage of this opportunity has been low and decreasing each year since 2001. Industry and non-governmental organisations still have no established system for hiring based on non-formal learning. In order to stimulate individual investments and interest in upskilling, competence-based exams (as in Finland) could be established to accredit skills for employment purposes.

Enhancing national worker mobility

Norway has lower mobility rates for highly skilled workers than other Nordic countries and little personnel movement between the public and private sectors. As in other OECD countries, overall worker mobility increased in the mid-1990s as economic conditions improved in Norway. However, the Norwegian information technology sector had a very low mobility rate before 1995 and, despite increases in the late 1990s, worker movements into and out of the sector are still far below other Nordic countries (Barth and Schøne, 2001). The relative decline of the manufacturing sector and the rise of technology-based services poses a challenge to the centralised wage formation system.

At the macro-level, real wage flexibility has been substantial. The social partners at the central level internalise the harmful macroeconomic effects of real wage growth in excess of productivity growth, with the sectors exposed to international competition defining the room for wage growth in sheltered sectors. But there is a relatively small wage-gap between high- and low-remuneration workers, and wage elasticity is low with respect to education-specific unemployment (Bjornstad *et.al.*, 2002). In comparing relative wages in Norway to those in other Nordic countries with similarly compressed wage and salary structures, one finds that the earnings of tertiary graduates are well below the average. However, this may also be due to the high supply of skilled workers.

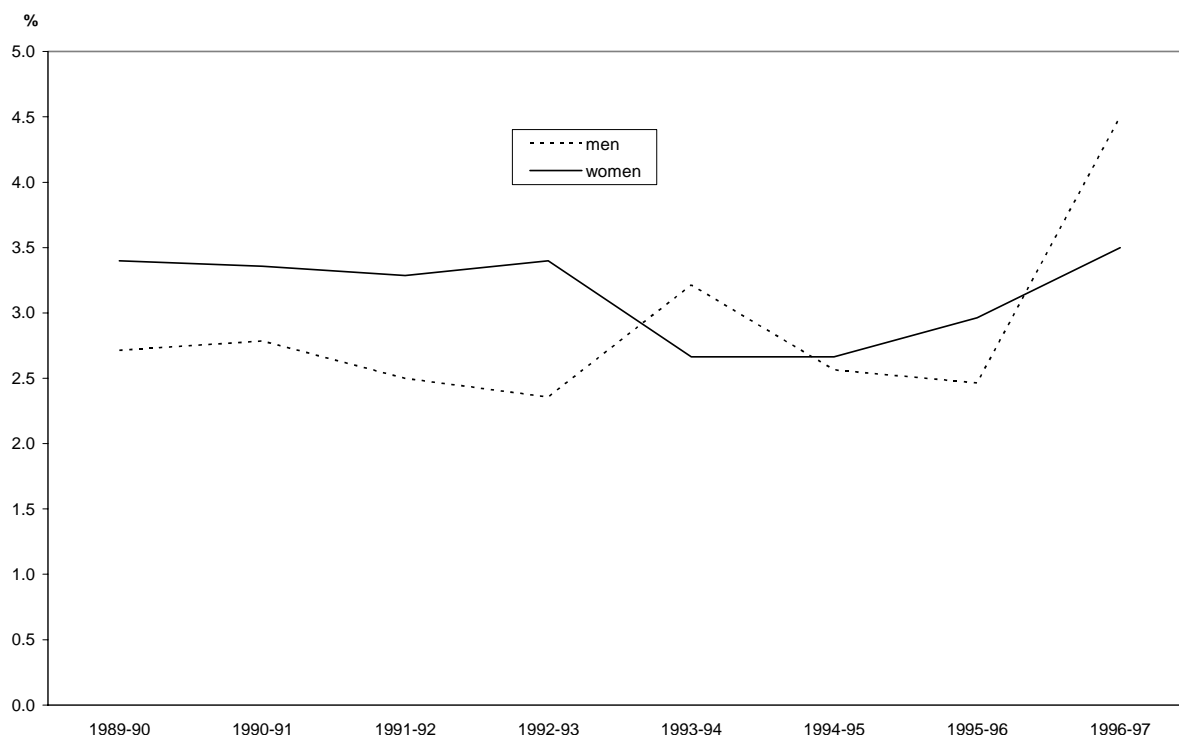
In general, the wage structure does not differentiate significantly across different educational groups and skill levels, reducing mobility between sectors. In the long-term, more flexibility should be introduced into the wage formation process through decentralised negotiations with some differentiation between industries. The government should consider a more disaggregated approach to wage negotiations taking into account sectoral, skill and local labour market conditions. This could exist alongside centralised bargaining, which has attractions for employers and unions in reducing transaction costs and providing signals for more detailed negotiations elsewhere (OECD, 2004).

Relative and geographical wage flexibility in the public sector is significantly lower than in the private sector. Public expenditures account for over 40% of GDP in Norway, and when calculated as a share of mainland GDP are the highest in the OECD at 55%. The public sector employs 30% of the workforce and acts as a strong source of demand for labour, until recently easily absorbing not only the growth in labour supply but also the falling demand for labour in the mainland business sector, in particular in manufacturing. However, the two core public service activities of education and health record high expenditures by OECD standards with lower than average performance outcomes. A number of reforms are needed – including more privatisation, outsourcing, performance standards and flexible wage-setting –

as proposed in the programme for *Modernising the Public Sector in Norway* (OECD, 2003b). Recently, the wage systems in the public sector have taken a turn in a more decentralised direction.

There is limited mobility of highly skilled workers between the public and private sectors. The share of the highly-educated which moved from the public to the private sector in the period 1989-1997 was on average only 3.5% (**Figure 6**). Although the total number of skilled workers in Norway is divided equally between the public and private sectors, they comprise 47% of government employees compared to 23% of industry workers. The public sector has offered greater job security which limited incentives to change employment. The recent introduction of fixed-term and temporary contracts has made public employment less secure. But the state labour force still tends to adjust upwards when new demand emerges and fails to adjust downwards when demand falls. There is a need to reconsider the nature and extent of public sector employment so as to better adjust the overall workforce to variable needs.

Figure 6. Mobility of highly-educated from public to private sector in Norway, 1989-1997



Notes: Movement of men and women with tertiary education from public to private sector.

Source: Barth and Schøne, 2001.

A more significant factor limiting mobility are pension arrangements which prohibit the transfer of occupational pension rights earned in the public sector to the private sector and vice versa. In general, when an employee resigns from a position, his membership in the occupational pension scheme is terminated and a paid-up policy reflecting the acquired pension claims is issued. In January 2004, a government-appointed *Pension Commission* recommended reforms including that the current “gross system” used in the public sector be changed to the “net system” as currently used in the private sector, partial price indexing, and greater coherence between benefits and contributions. However, some changes would require compensation for public employees whose pensions are consequently reduced. The Commission suggested that pension reform be put into force in 2010 and implemented over a period of 15 years.

Existing laws on employment protection also imply different conditions in the public and private sectors, which present a further obstacle to mobility. In February 2004, a government-appointed commission proposed a new *Working Environment, Working Time and Employment Protection Act* for the entire labour market. This law, which would be proposed to Parliament in 2005, would eventually replace present laws and regulations that have different rules for the public and private sectors and would help remove existing barriers to mobility. However, these reforms, including rules assuring the portability of pensions, need to be accelerated to increase the mobility and efficient allocation of highly skilled workers across the public and private sectors.

Adjusting to international worker mobility

Norway has limited inflows and outflows of highly skilled workers, with foreigners comprising only 6% of the total population. However, demographic trends indicate that there will be a need for greater immigration of skilled workers in certain fields, *e.g.* engineering and health care. In addition, reduction of trade barriers and deregulation of markets will contribute to increased globalisation, restructuring of industry and more intense competition both at home and abroad, necessitating greater staff mobility across national borders.

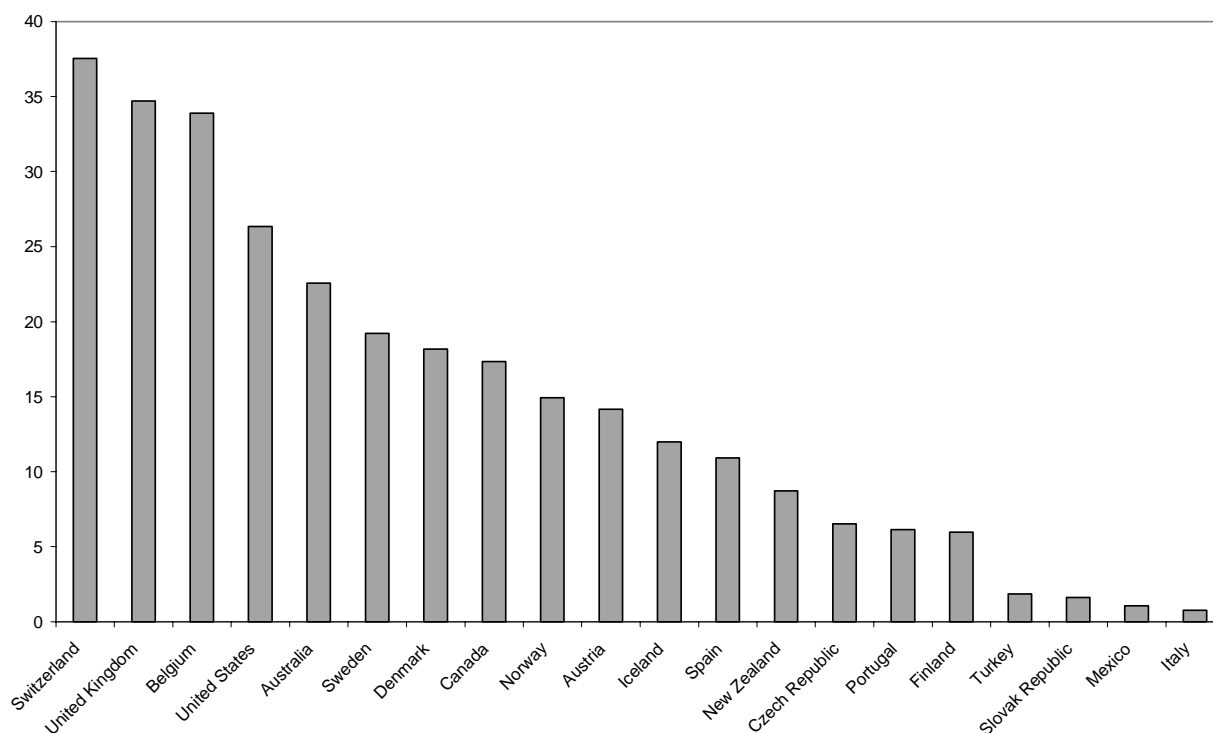
The government is taking steps to liberalise immigration rules for skilled workers from outside the European Economic Area (EEA), which includes the 15 EU Member States (plus the ten new member countries as of 1 May 2004), Iceland, Liechtenstein, and Norway. These countries now make up 60% of foreign nationals residing in Norway. At present, immigrants who intend to work or run a business in Norway must hold a work permit, an application for which can be made by the individual or the company. Nationals from Nordic countries are exempted from this rule, and EEA nationals only need a residence permit. To obtain a work permit there must be a concrete offer of employment from an employer or the applicant must be able to show a standardised contract of service signed by both the employer and the applicant. In 2002, the “specialist rule” was introduced which allows up to 5 000 work permits a year for skilled workers or specialists from outside the EEA. However, for those above this quota, it is still possible to be granted a work permit as a specialist based on an economic needs test. In 2002, only 1 700 persons came under the quota and the number further declined to 1 127 in 2003, indicating a lack of diversified skilled immigration into Norway.

More needs to be done to recruit skilled workers from abroad and to integrate them into the Norwegian labour market. In general, the *Public Employment Service* (PES) gives information and guidance to immigrants regarding vacancies, professions and education. In co-operation with the educational authorities in the municipalities, the PES assists in qualifying immigrants for the job market, and under the *Competence Reform*, a system was put in place to “translate” immigrant vocational competencies into formal Norwegian standards. The PES also provides assistance to employers in recruitment and job placement. A special programme was launched to recruit medical personnel from European countries, but in 2004, this programme was limited to dentists. However, there are limited training programmes in Norwegian language and culture offered in the home countries and few integration programmes in Norway. Most Nordic and European workers normally stay in Norway only on a temporary basis (Landsverk, 2003). In order to address future skills shortages, Norway should increase the incentives for EEA nationals to stay in the country and do more to attract the highly skilled from outside the EEA.

Nor are there a great number of foreign students in Norway partly due to the lack of comparable international degrees. In 2001, about 15% of PhD students came from abroad, mostly from Nordic and European countries (**Figure 7**). The *Quality Reform of Higher Education* introduced a new degree structure to facilitate comparison of Norwegian degrees with foreign ones and better integration with studies completed abroad. In accordance with the Bologna Declaration, standard Bachelor’s, Master’s and PhD degrees have been introduced to align the degree structure to that of other OECD countries. Under the

supervision of NOKUT, more Master's degree courses with instruction in English will also be introduced at state universities and university colleges and at some private institutions. However, more needs to be done to implement the recommendations of the Mjøs Commission to enhance the international orientation of Norwegian institutions and students. This includes international marketing of Norwegian education and formalised academic co-operation between Norwegian and foreign institutions (NOU, 2000).

Figure 7. Foreign PhD students as % of total enrolment, 2001

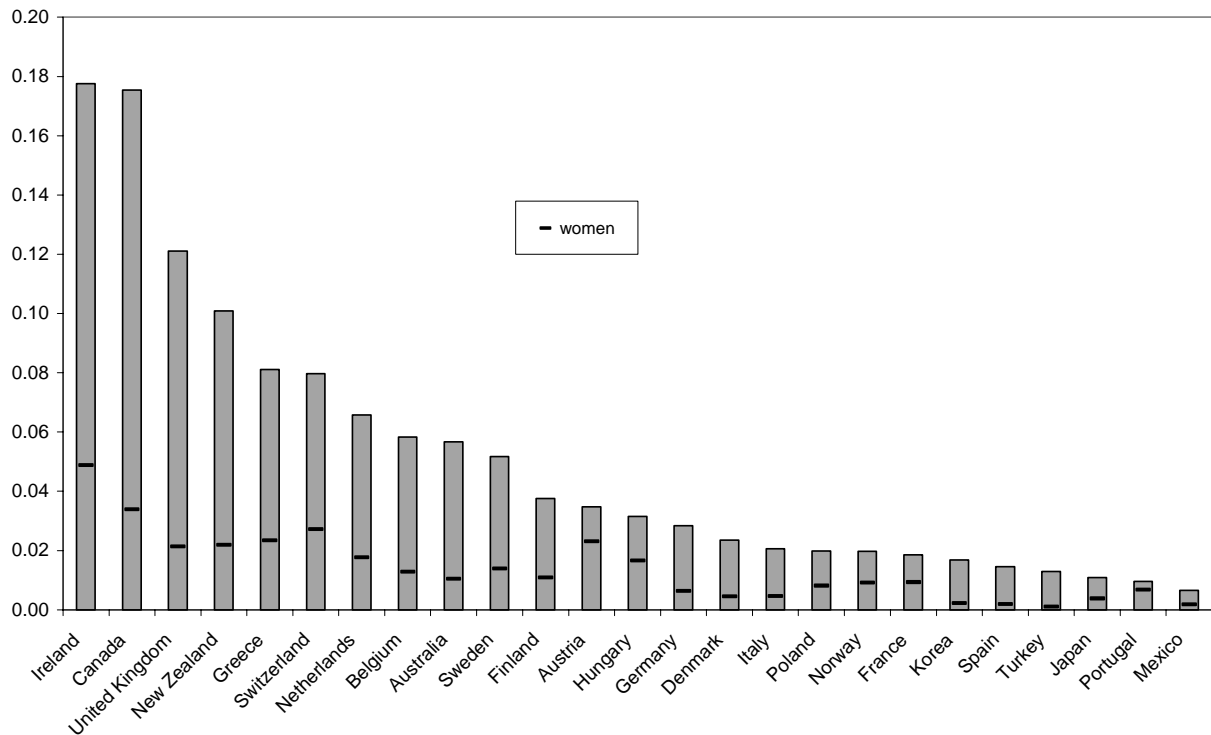


Source: STI Scoreboard 2003.

Emigration of skilled Norwegian workers is also rare. In 2002, just over 10 000 Norwegian citizens emigrated from Norway, primarily to other Nordic countries (*i.e.* Sweden and Denmark) or to other European countries such as Spain. Few Norwegian nationals emigrate to the United States, where they account for a very small share of foreign nationals with PhDs in science and engineering (**Figure 8**).

However, there are an increasing number of Norwegian students going abroad, partly due to generous government support programmes. During the last 25 years, about 6% of all students have studied abroad (Wiers-Jenssen, 2003). In 2002, there were approximately 15 000 Norwegian students studying for degrees abroad and receiving financial support from the *State Educational Loan Fund*. Educational grants and loans can be granted for a maximum of eight years and support is also provided for doctoral studies, travel, tuition and language studies. Financial guarantees are given to students to encourage studies in the United States and Canada, but most go to the United Kingdom or other Nordic countries and study primarily medicine, business, technology and art (SSB, 2001a). But in order to benefit from diversified foreign sources of knowledge and technology and to fill demands for new technical skills, Norway needs to attract more foreign students and skilled workers and enhance their integration into society and the workforce.

Figure 8. High-skilled foreign workers in the United States, 1999



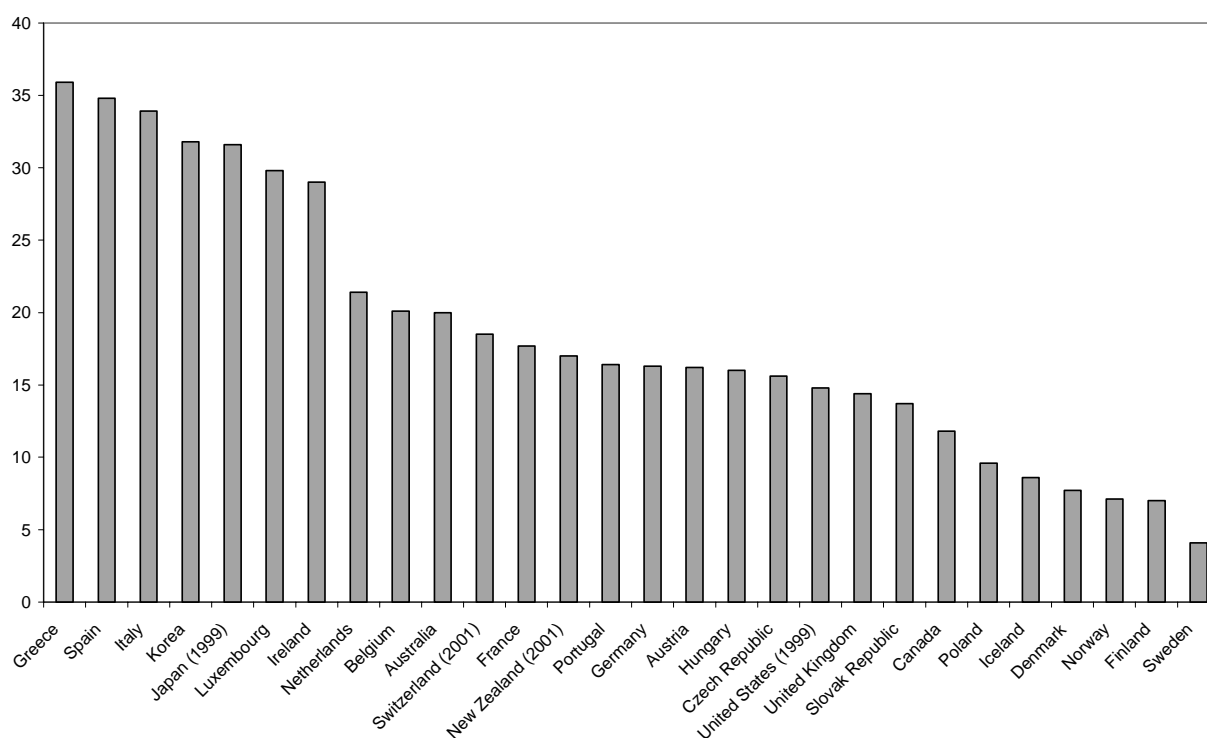
Notes: Non-US OECD citizens with science and engineering doctorates in the United States as % of source country's population.

Source: STI Scoreboard 2003.

Increasing workforce participation by highly skilled women

Norway has one of the highest female participation and employment ratios in the OECD, particularly for highly-qualified women (**Figure 9**). In 2003, the labour force participation rate for women was 76.5% in Norway compared to 61% for the European Union and 60% for the OECD. The increase in demand for qualified labour within the public sectors of health, welfare and education in the last decade has acted to increase the employment rate for qualified women as well as the general level of education among females in Norway. The employment rate for women with university education is 81% compared to 85% for men. The share of female workers in total employment is particularly high in the public sector.

Figure 9. Gender employment gap for highly-educated women, 2000



Notes: Percentage point difference between the employment rates for men and women with tertiary education.
 Source: OECD, 2002b.

However, a greater proportion of employed women in Norway (43%) work part-time compared to an average 26% in OECD countries, with 32% of Norwegian highly-educated women working part-time in 2002. Although this share has been decreasing since 1990, it is still among the highest in the OECD and indicates that skilled females may not be utilised to their fullest advantage in the labour force. But the large incidence of part-time employment may also be an underlying cause for high female labour force participation in Norway. The reasons for entering into part-time work are unclear. This may be due to good and affordable child-care facilities in Norway and a generous social protection system which facilitate part-time employment. Norwegian regulatory frameworks allow flexible working hours and formats. Since many women in Norway demand part-time work, it could be a consequence of gender roles, preferences and social norms (OECD, 2002b). Or it may be due to negative incentives stemming from occupational segregation and wage gaps with men. Women at all educational levels earn less than men in Norway, although this difference is less at higher educational attainment rates. In addition, outside the public sector, there are few women in managerial or high administrative positions. The Government has appointed a tripartite commission – the “Part-Time Committee”- to investigate the reasons for high levels of female part-time work and to suggest initiatives for reducing involuntary part-time work. A report is due by 1 October 2004.

Norway’s extensive family-friendly policies are a pre-condition for high female labour force participation, but also may have introduced disincentives to longer working hours for females. In the 1980s and 1990s, parental leave was lengthened and childcare arrangements expanded, partly due to a relatively high representation of women in democratically-elected bodies and in public service. Parental leave for mothers now consists of one year with 80% pay, including a four-week leave period for fathers, and the possibilities of a further two years unpaid leave. This is one of the most generous systems in the OECD, and public spending devoted to family support is now around 3.5% of GDP (Jaumotte, 2003). With regard to

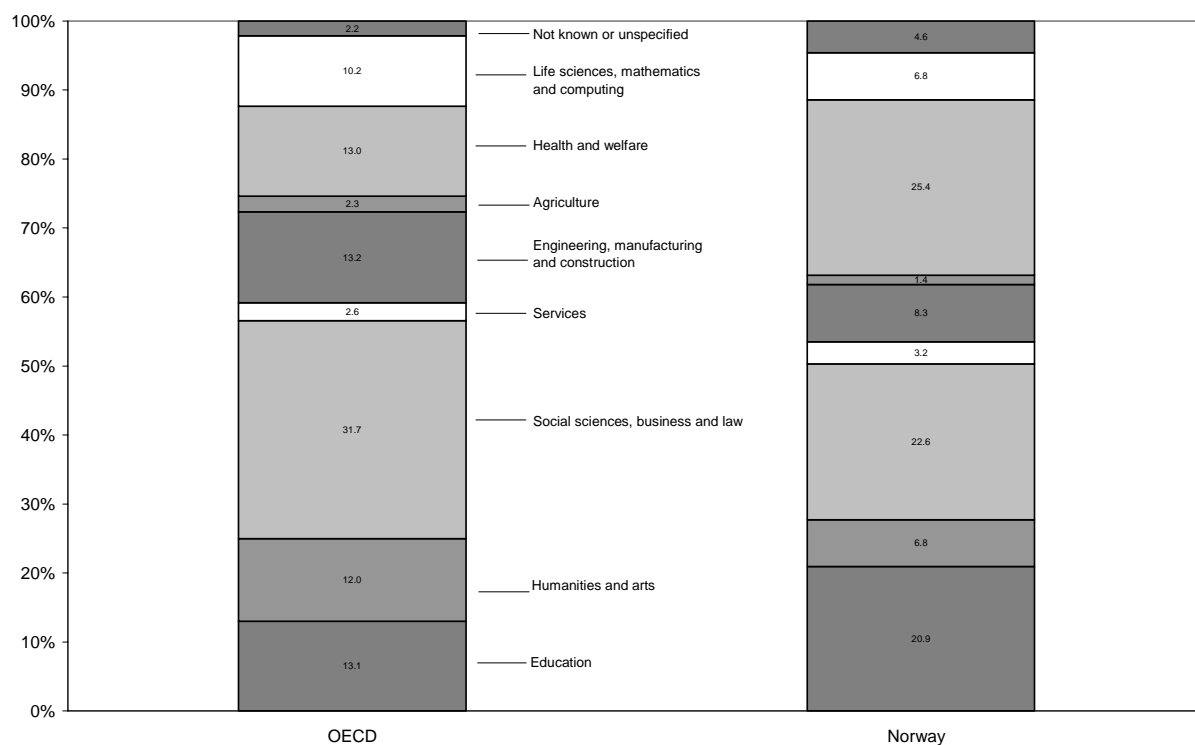
childcare, it has been recommended that the “money-for-care” benefit be replaced by vouchers to be spent in formal private or public childcare centres so as to outsource this service (OECD, 2004). A reform was introduced to lower the cost of childcare and place a ceiling on fees for publicly-funded childcare centres which should encourage more women to work full-time.

Norwegian women also make more traditional choices of occupation than do women in other OECD countries. In Norway, 80% of women work in the ten occupations that are most female-dominated compared to an OECD average of 60%. Although Norway has one of the highest rates of female employment, it also has among the highest levels of occupational segregation by gender (OECD, 2002*b*). This is predicted early on by gender differences in fields of study, with women strongly represented in health and welfare, education and humanities, and men pursuing science, industry-related and more technical subjects. While these schemes may be worthwhile, more attention needs to be given to understanding the factors leading to the predominance of part-time work among Norwegian women. The proposed reforms to the pension system are expected to remove one disincentive to more full-time work among females in Norway, but more should be done to address wage gaps with men. Extending the hours worked by highly-qualified women and diversifying their occupations is key to filling future requirements for highly skilled workers.

Developing human resources in science and technology

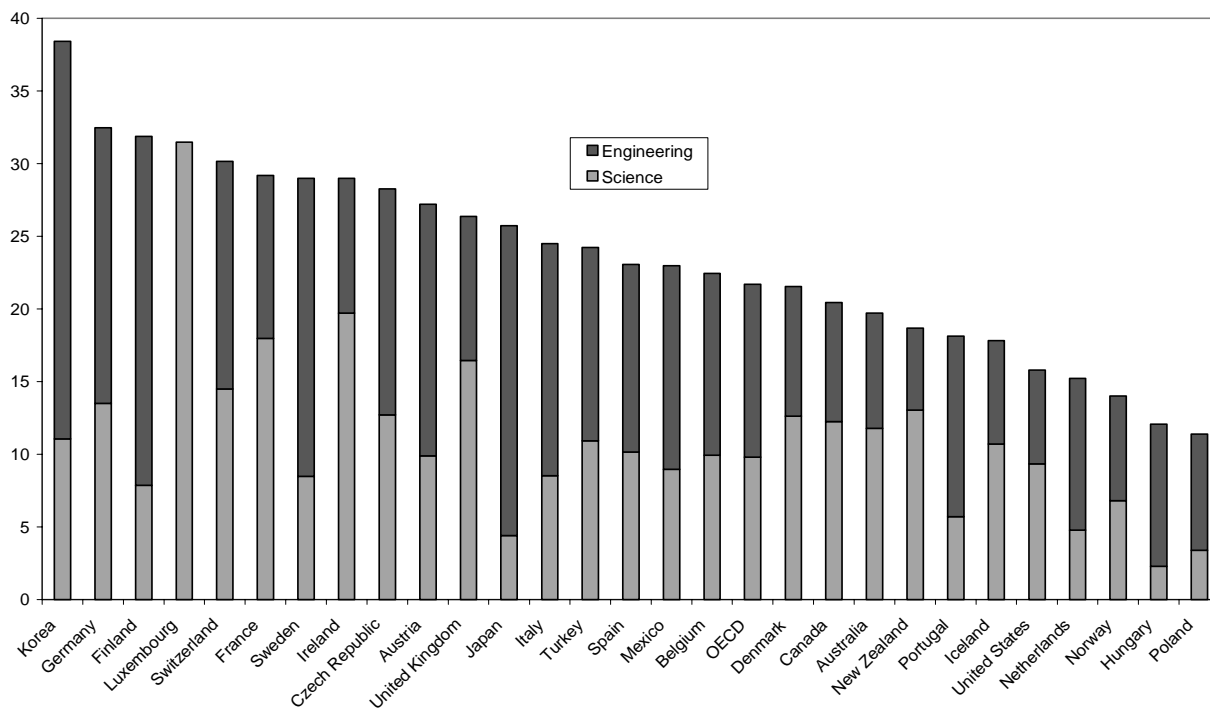
Norway has relatively low levels of human resources in science and technology (HRST) and severe problems of limited mobility between the public and private research sectors. New targets for national research and development (R&D) expenditures, which at 1.6% of GDP are below that of many OECD countries, are expected to greatly increase demand for technical personnel in the public and private sectors. Compared to other OECD countries, Norway has fewer graduates in engineering-related fields and more in education, health and welfare due primarily to high female enrolments (**Figures 10**). Only 15% of tertiary students each year graduate in technical fields like engineering, manufacturing, construction, physical sciences, mathematics and statistics, relative to the OECD average of almost 25% (**Figure 11**).

Figure 10. A-level tertiary graduates by field of study, 2001



Notes: Tertiary type-A education corresponds to tertiary academic education (university).
 Source: OECD, 2003a.

Figure 11. Science and engineering degrees as % of new degrees, 2000

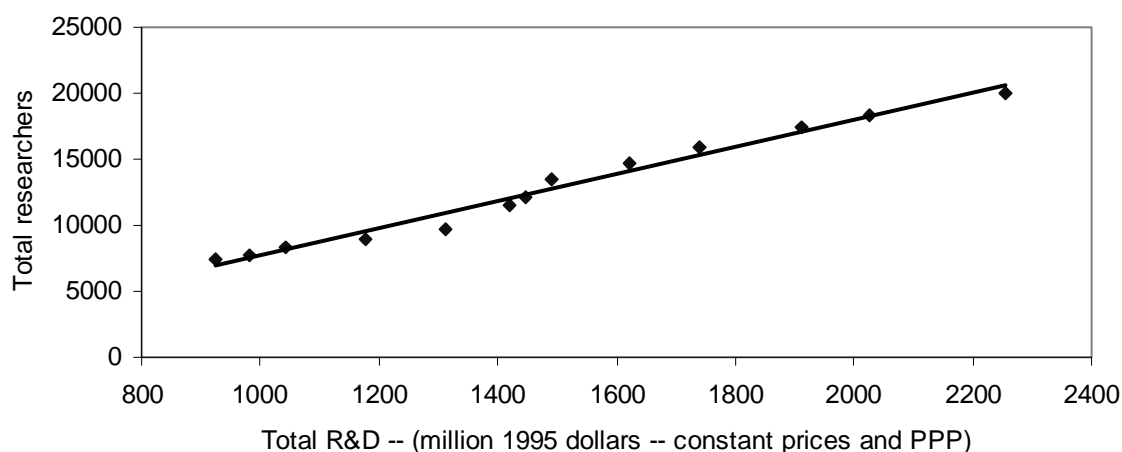


Source: STI Scoreboard 2003.

The government has set a target that R&D investment as a share of GDP reach the OECD average of 2.3% before 2005 (NHD, 2003). A *Research and Innovation Fund* has been established to augment public research expenditures, increase the number of public sector researchers by 30% and stimulate research investments by the private sector. Business R&D expenditures account for about 47% of the total, followed by the university research sector at 29% and the private research institutes at 25% (NIFU, 2001). Limited private R&D expenditures are to some extent explained by an industrial structure characterised by few research-intensive industries and a large share of small firms. However, Norway's resource-based sectors (petroleum, aluminium, fish farming) have become more technology-intensive as well as capital-intensive in recent years. Still, there are questions as to whether higher R&D investments alone will enhance the innovation capabilities of the economy. General reforms are needed – including more privatisation, greater public/private links and development of skilled HRST – which will provide the enabling conditions for greater research and innovation in the private sector (Andersson *et.al.*, 2003).

At a minimum, the R&D initiative is expected to fuel demand for researchers, as the number of research personnel has closely paralleled total R&D expenditures in the past (**Figure 12**). In 2001, Norway had about 20 000 researchers which, if the strong correlation between expenditures and researchers continues, has to increase to around 30 000 in 2005 for Norway to realise the R&D expenditure target. Given the current production of PhDs, this will put pressure on the technical high-end of the labour market and enhance the need for a mobile technical labour force.

Figure 12: R&D expenditures and researchers in Norway, available years 1981 to 2001



Note: R^2 equals 0.98 and the regression shows that 1 million PPP dollar additional R&D will require about 10 new researchers.

Source: OECD.

Norway has the lowest mobility rate into and out of public research among the Nordic countries, which is a continuing barrier to the effective and beneficial utilisation of the science and technology base (Graversen, 2001). Most employees in the public research sector came directly from their university studies or from academic research institutes rather than from the private sector. The share of researchers moving from public research to manufacturing industries is limited, about 4-5% over the period 1994-1999. Other studies show that mobility among employees of the private contract research institutes (which have substantial government funding) is significantly higher than among those working in the university research sector (Tvede and Sarpebakken, 1998). Academic institutes are more closely linked to the public sector, while the private research institutes were found to have 15% more linkages with industry. In addition to augmenting movements between public and private research, mobility should be stimulated between the two types of research bodies (Hauknes and Ekeland, 2002).

In 2000, the *Research Council of Norway* initiated a programme to promote increased mobility of researchers, including a subsidy of the first year's salary of public sector researchers working in industry. Other provisions included 50% funding of costs for three years related to the temporary employment of researchers in industry, 100% coverage of costs for two years employment of recent PhDs in companies, and grants of up to 50% of salaries for three years to fund industry researchers in R&D institutes and universities. However, reviews found that researchers did not tend to stay in firms and the programme had only a marginal influence on overall mobility rates (Hauknes and Ekeland, 2002). Through another programme, the "*Professor II Positions*" scheme, business researchers spend on average one day per week at universities, teaching and supervising students and doctorates. The Ministry of Labour and Administration (AAD) is considering measures to increase mobility of highly skilled workers between the public and private sectors, including researchers.

The low level of skills in science and engineering is partly due to disinterest among Norwegian women. Females are under-represented among researchers, comprising about 28% of the total. Women researchers are principally found in the higher education sector and government with a lesser presence in business. The government has adopted a strategy to address the low supply of science and engineering graduates, which includes an initiative directed to females (KUF, 2003a). *Mathematics, Science and Technology - naturally...*, which will be implemented in 2002-2007, aims to increase female participation in science-related subjects at both secondary and tertiary levels. However, the measure directed towards reducing the gender gap is only one of a total of 28 initiatives and may not have a major impact.

Norway has implemented other initiatives to generate more interest in undertaking technical studies and engaging in science and technology occupations. The government has adopted a strategy to strengthen the position of science in society in 2002-2007 entitled "*Natural sciences, of course!*" (KUF, 2003b). The science strategy involves developing Internet-based science training programmes, offering teacher grants for mathematics training, and evolving the *National Centre for Contact between the Business Community and Science, Mathematics and Technology* (RENATE) as a centre for science-oriented interaction with working life. RENATE aims to establish links between educational institutions and the business community with special reference to increasing the recruitment of students in math, science and technology, including the share of women in technical fields. Still, Norway's knowledge base in science and engineering remains weak. Increasing capacity and enrolment in science and technology education is more important than a continued increase in the general level of education, and this will require efforts from early schooling through tertiary education. And despite recent schemes, enhanced mobility of researchers between the public and private sectors is not likely to occur until the portability of pensions is assured.

REFERENCES

- Andersson, T., J. Kind and C. Logan-Andersen (2003), *Towards a New Growth and Innovation Policy in Norway*, International Organisation for Knowledge Economy and Enterprise Development (IKED).
- Barth, E. and P. Schøne (2001), "Mobilitet fra offentlig til privat sektor – hva betyr konjunktorendringer og lønn?" *Søkelys på arbeidsmarkedet 2001, årgang 18*, Oslo.
- Bjornstad, R., A. Cappelen, I. Holm and T. Skjerpen (2002), "Past and Future Changes in the Structure of Wages and Skills", *Statistics Norway Documents*, 2000/4.
- 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.
- Butler, R. (2001), "Lifelong Learning in Norway: An Experiment in Progress," International Longevity Center, New York.
- Døving, E., Skule, S., Ure, O.B., and Teige, B (2003), "Evaluering av Kompetanseutviklingsprogrammet, underveis rapport 2003", Bergen.
- Eurostat (2002), "Continuing Vocational Training in Enterprises in the European Union and Norway (CVTS2)", *Population and Social Conditions*, Luxembourg.
- Fafo -- Institute For Applied Social Science (2004), *Lærevilkårsmonitoren 2003*, Oslo.
- Graversen, E.K. (2001), "Human Capital Mobility Into and Out of Research Sectors in the Nordic Countries", in OECD (2001), *Innovative People: Mobility of Skilled Personnel in National Innovation Systems*, Paris.
- Hauknes, J. and Ekeland, A. (2002), "Mobility of Researchers – Policy, Models and Data", STEP Group, Oslo.
- Jaumotte, F. (2003), "Female Labour Force Participation: Past Trends and Main Determinants in OECD Countries", *OECD Economics Department Working Papers*, No. 376.
- Landsverk, C. (2003), *SOPEMI Norway 2003: Trends of Migration to and from Norway and the Situation of Immigrants in Norway*, Oslo..
- Ministry Of Education And Research (KUF) (2002), *Competence – Motivation – Recruiting*, Oslo.
- Ministry Of Education And Research (KUF) (2003a), *Mathematics, Science and Technology – Naturally: Strategy for Raising the Competence Level in Math, Science and Technology, 2002-2007*, Oslo.
- Ministry Of Education And Research (KUF) (2003b), *Natural Sciences, of course!*, Oslo.

- Ministry Of Finance (FIN) (2000), *NOU 2000: 21, En strategi for sysselsetting og verdiskaping*, Oslo.
- Ministry Of Labour And Government Administration (AAD) (2001), *The Norwegian Labour Market 2001*, Oslo.
- Ministry Of Trade And Industry (NHD) (2003), *From Idea to Value: The Government's Plan for a Comprehensive Innovation Policy*.
- Næss, T. (2000), *Utdanning frem til år 2015*, Report 10/2000, Norwegian Institute for Studies in Research and Higher Education, Oslo.
- Norwegian Industrial And Regional Development Fund (SND) (2002), *FRAM Programmet Årsrapport 2002*.
- Norwegian Institute For Studies In Research And Higher Education (NIFU) (2002), *Report on Science & Technology Indicators for Norway 2001*, Oslo.
- OECD (2000), *Thematic Review of Adult Learning: Norway*.
- OECD (2002a), *Reviews of National Policies for Education: Lifelong Learning in Norway*.
- OECD (2002b), "Women at Work: Who are They and How are They Faring?" *OECD Employment Outlook 2002*.
- OECD (2003a), *Education at a Glance 2003*, Paris
- OECD (2003b), *Regulatory Reform Review of Norway: Preparing for the Future Now*.
- OECD (2003c), "Upgrading Workers' Skills and Competencies", *OECD 2003 Employment Outlook*.
- OECD (2004), *OECD Economic Surveys: Norway*.
- Official Norwegian Report (NOU) (2000), "Report of the Mjøs Commission on Evaluation of Higher Education In Norway after the Year 2000", Oslo.
- Salvanes K. G. and S. E. Førre (2003), "Effects on Employment of Trade and Technical Change: Evidence from Norway", *Economica*, 70.
- Statistics Norway (SSB) (2001a), *Eighty-Five Per Cent More Students Abroad*, Oslo (Available in English at <http://www.ssb.no/vis/english/subjects/04/art-2001-03-08-01.html>)
- Statistics Norway (SSB) (2001b), *Universities and Colleges Key Figures 2000*.
- Statistics Norway (SSB) (2002), *Immigration and Emigration, by Norwegian/Foreign Citizenship and Country of Immigration/Emigration*.
- Statistics Norway (SSB) (2003a), *Én av fire jobber deltid*, Oslo.
- Statistics Norway (SSB) (2003b), *Labour Force Survey. Education and Training, 2nd quarter 2003*, Oslo. (Available in English at http://www.ssb.no/english/subjects/06/01/akukurs_en/)

Statistics Norway (SSB) (2003c), *Most Females with Tertiary Education*, Oslo. (Available in English at http://www.ssb.no/english/subjects/04/01/utniv_en/)

Tvede, O and Sarpebakken, B. (1998), "Rekruttering til norsk forskning: status og behovsanslag mot år 2015", NIFU Rapport 13/98, Oslo.

Ure O.B. and Skule, S. (2003), "Elektronisk kunnskapsnettverk og verktøy for livslang læring? En evaluering av Norgesuniversitetets første virkeår", FAFO-notat 2003:2, Oslo.

Wiers-Jenssen, J. (2003), *Norwegian Students Abroad. Experiences of Students from a Linguistically and Geographically Peripheral European Country*, Studies in Higher Education.