EUROPEAN TREND CHART ON INNOVATION

Country Report:
Finland

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EUROPEAN COMMISSION DIRECTORATE GENERAL ENTERPRISES
"INNOVATION AND SME" PROGRAMME

The European Trend Chart on Innovation

Innovation is a priority of all Member States and of the European Commission. Throughout Europe, hundreds of policy measures and support schemes aiming at innovation have been implemented or are under preparation. The diversity of these measures and schemes reflects the diversity of the framework conditions, cultural preferences and political priorities in the Member States. The "First Action Plan for Innovation in Europe", launched by the European Commission in 1996, provided for the first time a common analytical and political framework for innovation policy in Europe.

Building upon the Action Plan, the "Trend Chart on Innovation in Europe" is a practical tool for innovation policy makers and scheme managers in Europe. Run by the "Innovation" directorate of DG Enterprises, it pursues the collection, regular updating and analysis of information on innovation policies at the national and Community levels, with a focus on innovation finance, the setting up and development of innovative businesses, the protection of intellectual property rights and the transfer of technology between research and industry.

The Trend Chart serves the "open policy co-ordination approach" laid down by the Lisbon Council in March 2000. It supports policy makers and scheme managers in Europe with summarised information and statistics on innovation policies, performances and trends in the European Union. It is also a European forum for benchmarking and the exchange of "good practices" in the area of innovation policy.

The "Trend Chart" products

The Trend Chart on Innovation has been running since January 2000. It tracks innovation policy developments in all EU Member States, plus Bulgaria, Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Liechtenstein, Lithuania, Norway, Poland, Romania, the Slovak Republic and Slovenia. The Trend Chart web site (www.cordis.lu/trendchart) will provide access to the following services and publications as they become available:

- a database of policy measures across Europe
- a "Who is who?" of agencies and government departments involved in innovation
- a series of country reports
- a series of six-monthly trend reports
- a number of benchmarking reports on specific themes
- statistical reports, such as the European Innovation Scoreboard
- the six-monthly newsletters of the Trend Chart
- the annual reports of the Trend Chart
- other publications

The present report was prepared by Pirjo Niskanen and Aleksi Neuvonen from the VTT Group for Technology Studies. The information contained in this report has not been validated in detail by the Member States or by the European Commission.

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CONTENTS

Executive Summary

In Finland, R&D expenditures have increased dramatically in the last two decades and today they make up over three percent of Finland's GDP. This development is matched by a growing number of people and organisations engaged in R&D activities and in higher education.

The GDP share of R&D expenditure increased from 2.0 percent in 1991 to 3.2 percent in 1999. In real terms, R&D expenditure more than doubled during the 1990s. In 1999, Finland's GDP share of R&D expenditure was the second highest in the world after Sweden. Preliminary estimates suggest that the same rate of growth continued in 2000, the current estimate being 3.3 percent. Most of the increase in R&D expenditure is explained by the increase in business enterprise sector R&D expenditure. Business enterprises' share of R&D expenditure increased from 57 percent in 1991 to 68 percent in 1999. The increase is explained almost entirely by the growth of the electronics industry.

In the government's appropriations for 2002, the R&D funding for universities will increase nominally by 7 percent whereas funding for the Academy of Finland and Tekes will maintain the same level as in 2001. The overall increase of government appropriations for R&D is 3 percent.

There are two major initiatives in Finland to promote intra-sectoral collaboration in particular. The first, the Centre of Expertise Programme, is a regional measure aimed at enhancing regional competitiveness by strengthening innovation, renewing the production structure and creating new jobs within the expertise areas selected. The second initiative, the cluster programme, aims to support R&D that strengthens industrial clusters. Regional development is also being enhanced by the Regional Centre Development Programme, which was launched in August 2001 and is administrated by the Ministry of the Interior.

In regional terms, however, the R&D activities in Finland are still highly concentrated and this tendency is set to continue. The three largest sub-regional units (Helsinki, Tampere and Oulu) together accounted for 69 percent of total R&D expenditure in 1999. Incubator schemes have been established in close association with the regional technology parks and universities since the late 1980s. In the late 1990s, there were some 15 incubator schemes in Finland. The Finnish venture capital industry has been growing since the early 1990s, but is still on rather a low level.

Co-operation between research institutes, universities and companies has been intensified in many ways. The single most important initiative has been the national technology programmes of Tekes (National Technology Agency). They are demand-oriented in the sense that they have been planned with the needs of companies in mind, and have been implemented in collaboration with companies.

The main weaknesses in the Finnish innovation performance have been the weakly developed venture capital industry, the low proportion of SMEs innovating in-house and the low proportion of new market capitalisations. In May 2001 Tekes and Sitra launched a new measure called PreSeed Finance (FI13), which aims at improving conditions in the commercialisation of technology projects and opening venture capital funding for companies that use innovative technology.

0. Innovation Policy in Finland

0.1. National system of governance of innovation policy

The two most important ministries in the Finnish national innovation system are the Ministry of Education and the Ministry of Trade and Industry (see Figure 3). Each administers approximately 38 percent of the public research funding. Apart from these two ministries, the Ministry of Social Affairs and Health and the Ministry of Agriculture and Forestry, in particular, are also significant funders of research.

The administrative field of the Ministry of Education covers all 20 universities, a network of polytechnics and the Academy of Finland, which includes four national research councils. In addition, the Ministry of Education and the universities together maintain basic services and infrastructure (e.g. scientific libraries, archives and supercomputing facilities) for the national research system.

The Academy is the central financing and planning body in basic and university research. The main function of financing high-quality research is carried out by individual projects, programmes, centres of excellence, research posts and research training. The Academy's responsibilities also include the advancement of scientific research and the encouragement of its exploration, and the development of international scientific co-operation. It also serves as an expert body on science policy issues. In 2001, the share of government appropriations for R&D was 14 percent.

The Ministry of Trade and Industry is responsible for technology policy and providing support for industrial research and development. It also exercises prime responsibility for issues related to EU research in Finland.

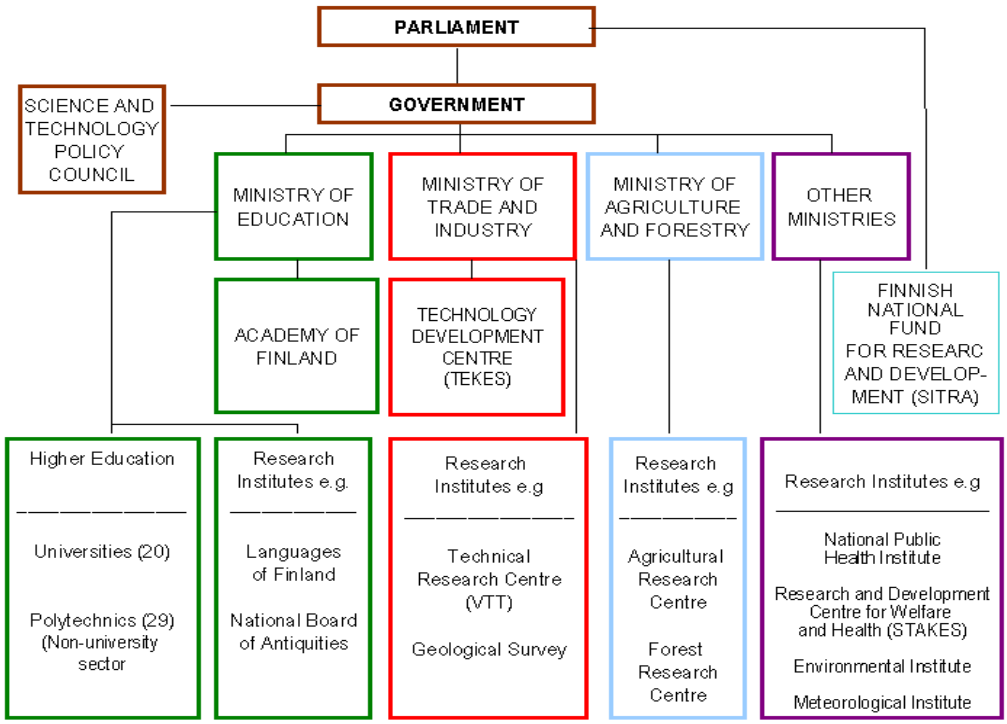
In the Ministry of Trade and Industry's administrative field, the National Technology Agency (Tekes) has a corresponding position in the planning and financing of technical research and development. It is the principal source of public funding for applied technological research and industrial R&D. It seeks to promote the competitiveness of Finnish industry and the service sector by promoting research and applications in the field of technological development. Tekes prepares, funds and co-ordinates national technology programmes, and provides funds for applied technical research and risk-carrying R&D ventures in industry. It also contributes to the preparation of national technology policy. Tekes has a regionally comprehensive domestic organisation which acts in conjunction with the Employment and Economic Development Centres. With its 30% share of government appropriations for R&D, Tekes is the largest organisation in the field.

The other body in the administrative field of the Ministry of Trade and Industry is the Technical Research Centre of Finland (VTT).VTT is an impartial expert organisation that carries out technical and techno-economic research and development work. It is the largest governmental research institute in the Nordic countries and has about 3000 employees.

The first assessment study on the economic and social impacts of VTT's R&D activities was carried out recently (Antila and Niskanen 2001). Similar studies have not been carried out at other research institutes in Finland. Studying the impacts of R&D results provided information on the use of public funds and on their significance as a promoter of industrial

competitiveness. It also yielded information on the objectives and usefulness of the organisation's activities.

Figure 1. The structure of the Finnish R&D system.



The other ministries bear the responsibility for research which serves the development of their respective fields. Most of this sectoral research is carried out in sectoral research institutes. There are over twenty sectoral research institutes working in nine administrative fields.

Another significant player in the Finnish R&D system is the Finnish National Fund for Research and Development (Sitra). Sitra is a relatively autonomous organisation that is subordinate to the Finnish Parliament. Sitra's operating segments are technology transfer and seed finance, the financing of growth companies, investments in venture capital funds, and strengthening of the links between research and societal decision-making through research and training.

The Science and Technology Policy Council was established in March 1987 to continue, with a slightly different emphasis, the tasks of the Science Policy Council founded in 1963. The Council is chaired by the Prime Minister. The membership consists of the Minister of Education, the Minister of Trade and Industry, the Minister of Finance, four other ministers, and ten other members well versed in science or technology (representatives of the Academy of Finland, Tekes, industry, and employers' and employees' organisations). The government appoints the Science and Technology Policy Council for a three-year term.

The main tasks of the council include directing science and technology policy, dealing with the overall development of scientific research and education, and issuing statements on the allocation of public science and technology funds to the various ministries and fields. These guidelines and issue statements are made public in triennial key policy documents, the latest being the "Review 2000: The Challenge of Knowledge and Know-how". The previous documents appeared in 1996 ("Finland: a knowledge-based society"), in 1993 ("Towards an innovative society – a development strategy for Finland") and in 1990 ("Review 1990 – guidelines for science and technology policy in the 1990s").

0.2. Innovation performance

The EU Research Commission recently published the first comparable key figures on the emphases and achievements of national research and innovation activities in the EU Member States (see http://europa.eu.int/comm/research/area/benchmarking2001_en.html). Finland turned out to be a model country in this benchmarking, achieving above-average figures for the EU in virtually every category and showing only a few weaknesses.

According to the benchmarking, the average annual growth in industry-financed R&D in Finland is 17.51% (EU average 4.86%). Moreover, Finland's industry-financed R&D is now 3.18% of industrial output, second only to Sweden's 3.98% (EU average 1.42%).

The growth of total funding for research (13.02%) was also the highest in Finland (EU average growth 3.03%).

Researchers' share of the work force was the highest in Finland (10.62 researchers/1000 members of workforce; EU average 5.28).

Finland's 265 European Patents per million population, is second only to Sweden's 289, in the number of European patents granted (EU average 125) and sixth in U.S. patents, proportioned to the population.

The number of scientific publications per million population was the third highest in Finland (1157, compared with the EU average 613). According to a recent bibliometric study on scientific publishing in Finland (Persson et al. 2000), Finland's share of world output increased from 0.59 % in 1981 to 0.92 % in 1998. Although all the Nordic countries except Denmark show growth in publication numbers, the growth was strongest for Finland and Sweden. The study also shows that the most rapid increase in collaboration in the 1990s took place with EU countries.

The main weaknesses in the Finnish innovation performance have been the weakly developed venture capital industry, the low proportion of SMEs innovating in-house and the low

proportion of new market capitalisations. In May 2001, Tekes and Sitra launched a new measure called PreSeed Finance, which aims at improving the conditions for the commercialisation of technology projects and opening venture capital funding for companies that use innovative technology.

In the 1980s the annual growth rate in the volume of R&D was approximately 10 percent on average, the highest rate of any OECD country at the time. In the 1990s the trend accelerated and the government set the aim of raising R&D input as a share of GDP from 2.35 percent in 1995 to a 2.9 percent in 1999. The target was achieved and even exceeded by 1999. In 1999, the GDP share of R&D expenditure was 3.2%, which is the second highest in the world after Sweden. Preliminary estimates suggest that the same rate of growth continued in 2000, the current estimate being 3.3 percent. The latest recommendation of the Science and Technology Policy Council is that government research funding should be increased during 2000-2004 at a rate which corresponds to the estimated growth of GDP. This means maintaining public research funding at 1.04% of GDP.

Public sector R&D expenditure has recorded an annual average growth in the 1990s of just over one percent. The sector's share of total R&D expenditure has dropped from over 20 percent at the beginning of the decade to no more than 12 percent. R&D expenditure in the university sector has risen more by virtue of increased extramural funding. The average annual increase in this sector stands at around six percent.

Research and development funding in the 2002 Government appropriation proposal exceeds € 1.19 billion. The increase in funding over the year 2001 is € 35 million, which is 3 percent in nominal terms. The growth is mainly due to the strengthening of the universities' research funding, which will increase by 7 percent. The Academy of Finland accounts for 14 percent of all public R&D funding. The National Technology Agency remains a major public funding agency of R&D. In 2001, the share of the National Technology Agency will account for 30 percent of all public R&D funding.

0.3. Innovation policy developments

In the early 1990s, the focus of Finnish policy related to science and technology started to shift from technology-oriented policy towards innovation-oriented policy. An important milestone in the formulation of the "new" innovation policy was the 1990 review of the Science and Technology Policy Council. The review made the concept of a national innovation system an important instrument of Finland's science and technology policy (Science and Technology Policy Council of Finland 1990).

The concept of a national innovation system has increased awareness of the role of innovations in economic and social development. It has extended the analysis of issues from research activity to other factors influencing research and development, and it has enhanced intergovernmental co-ordination. It has most probably increased national co-operation between different sectors and organisations. Moreover, it has ensured an increase in the resources for industrial research, in particular.

A forthcoming Ministry of Trade and Industry report Industrial Policy in New Economy once again states that Finland's national innovation system is among the best in the world. The main strength is the collaboration between authorities, research institutes and companies. However the systems need to be constantly improved in order to maintain national competitiveness. (Ministry of Trade and Industry 2001)

The role of sectoral research was outlined in more detail in the Science and Technology Policy Council's recent statement (Strategic development of Ministries' sectoral research) published in May 2001. The strategic role of the Ministries has become increasingly knowledge-based, and sectoral policies will need to be guided more on the basis of relevant research. This will entail integration of the Ministries' research strategies and their steady demand-based updating. Overall, this means the strengthening of resources for sectoral research. (Science and Technology Policy Council 2001a)

In the mid-1990s, another concept began to be integrated into the concept of the national innovation system - the knowledge-based society (of Finland 1996). This was an important change in the ideology of Finland's economic policy. The new policy places emphasis on globalisation, innovations and productivity growth. The central prerequisite for these is regarded as increased knowledge and expertise through education, training and R&D. In Finland, particular attention has been paid to the information technology and communications industries and, more broadly, to the competitiveness of the infrastructure necessary for the application of information technology and for the knowledge-based society.

Another statement of the S&T Policy Council (Innovation policy guidelines: intelligent, learning and competitive Finland) was published in May 2001. The Council states that the previous steps were successful and should be continued. Funding for universities' basic education and research should be increased, together with utilisation of research knowledge. Also, the importance of an active innovation environment for balanced regional development is emphasised in the statement of the S&T Policy Council. These same priorities for further strengthening of the innovation environment are also addressed in the government's appropriations for 2002. (Science and Technology Policy Council 2001b)

In recent years, one of the most significant changes within the national innovation policy has been the creation of new organisations associated with technology transfer, diffusion and commercialisation. Nationwide networks of technology parks and centres of expertise have been set up in Finland. The technology parks have initiated spin-off projects and incubators. Different kinds of technology transfer companies have been established to commercialise the results generated in universities and research institutes. Public and private venture capital operations have increased, although the market in Finland is less developed than in many other European countries, not to mention the United States. Some of these arrangements have been created at the national level. In May 2001 Tekes and Sitra launched a new measure called PreSeed Finance(FI13), which aims at improving the conditions for the commercialisation of technology projects and opening venture capital funding for companies that use innovative technology.

However, many commercialisation and diffusion activities have come into being on the basis of local and regional initiatives, albeit with national funding. In short, the role of regional innovation policy has been growing in Finland.

The increasing role of venture capital in the commercialisation of innovations and the increase of entrepreneurship is recognised in a forthcoming Ministry of Trade and Industry report on industrial policy – as is the role of both national and regional initiatives in the field. The IPR system should also be developed in line with international requirements.
One of the most significant innovation policy measures, the government's additional appropriation for research, was evaluated in 2000. The evaluation report included several

recommendations which are likely to guide the focusing of governmental funding in the future. In the governmental appropriations for 2002, assessment activities are included in the Finnish innovation environment.

The above-mentioned report on industrial policy recognises the assessment's positive conclusion on the additional appropriation programme. Therefore, it is proposed that public R&D funding should be taken care of in order to create conditions for the continuous development and creation of new competitive business activities.

In 2001 the Ministry of Trade and Industry and the National Technology Agency (Tekes) launched a new research programme for technology and innovation studies on the interaction between technology, business and society. The programme is scheduled to last four years and its budget is €8 million.

The role of international co-operation in public R&D activities is now being stressed in the two recent statements of the Science and Technology Policy Council and in the government's appropriations for 2002. Participation in EU research programmes and networks of centres of expertise will be strengthened.

Innovation policy priorities table

Priority areas and sub-areas	**country**
I. Fostering an Innovation Culture	14
I.1. Education and initial and further training	**3**
I.2. Mobility of students, research workers and teachers	**2**
I.3. Raising public awareness and involving those concerned	**2**
I.4. Innovation and management of enterprises	**2**
I.5. Public authorities	**1**
I.6. Promotion of clustering and co-operation for innovation	**4**
II. Establishing a Framework conducive to Innovation	13
II.1. Competition	**3**
II.2. Protection of intellectual and industrial property	**2**
II.3. Administrative simplification	**2**
II.4. Legal and regulatory environment	**1**
II.5. Financing of innovation	**4**
II.6. Taxation	**1**
III. Gearing Research to Innovation	*13*
III.1. Strategic vision of research and development	**1**
III.2. Strengthening research carried out by companies	**3**
III.3. Start-up of technology-based companies	**3**
III.4. Intensified co-operation between research, universities and companies	**4**
III.5. Strengthening the ability of SMEs to absorb technologies and know-how	**2**
Total points	**40**

0.4. Recent policy events & policy debate

Public debate in Finland related to science, technology and innovation covers a broad spectrum of topics. In the later part of the 1990's Finland's rise into the forefront of high-tech countries has created some debate, while university funding has also been a topic of continuous debate.

The programme of the government states that Finland must be in the forefront, in terms of technology policy. The future of Finland and the Finns is strongly bound up with knowledge and expertise as well as the ability to utilise this knowledge and expertise to create new innovations. Raising the level of expertise of the whole nation will support Finland's development as an advanced country and will, at the same time, enhance Finland's competitiveness. The government says that the Finnish research environment will be further developed to make it internationally competitive. The public funding of Finnish innovation programmes will be developed in such a way that top-level innovative research will be encouraged irrespective of its field in arts or sciences. The government states that the policy of creating centres of excellence will be continued. Also in the light of the government's appropriations for 2002 this same development will be carried on.

One important topic has been the financing and allocation of public R&D resources. As a result of the decision taken by the Finnish government in 1996, public R&D financing has been growing significantly. One ground for criticism has been that the decision favours applied research in general and technical development activities in particular. However, there are some signs that the emphasis is shifting towards basic research as university core funding is being strengthened and the R&D input to the Academy of Finland's centres of excellence is increasing.

University core funding has been a central topic of public debate in recent years. The question of university funding has been addressed in several recent policy documents, and concrete measures leading to an increase in university core funding were presented in the government "future package" decided in May 2000. At the beginning of 2001 the government introduced a development plan for university funding. Nevertheless, the plan does not fulfil all the expectations and some commentators believe that the increase of funding (€90 million until 2004) will not be enough. In her latest statement, the Minister of Education, Ms Maija Rask stresses that the funding of the universities will further increase after 2004 by nearly € 190 million, which will be partly covered from the Academy of Finland's Centre of Excellence programme.

The role of Nokia Corporation as a flagship of Finnish high technology has been debated in Finland in recent years. Nokia alone accounts for a major part of several central economic figures; the company's R&D input is €2.5 billion, which is twice as much as the public R&D input. The current stagnation in the ICT sector has influenced the growth prospects of Nokia. However, so far it is not known whether Nokia has decreased its contribution to R&D activities.

The assessment of the additional appropriation for research carried out in 2000, suggested that an important area for development is the integration of the new and old economies so as to preserve conventional jobs and create new ones. New measures should be launched to encourage SMEs to take up new technology.

0.5. Regional policy

The regionalisation of innovation policy has been one important topic of public debate in Finland. The EU's regional policy and the Structural Funds in particular have been influential. There have been several arguments supporting the empowerment of regions (equal development of regions, reduction of disparities in social and economic development between regions, exploitation of regional potential, proximity, expertise, etc.). The implementation of the Structural Funds' programmes may strongly affect research, technological development and innovation, since these activities are considered one of the main priorities in the programmes. On the other hand, it has been pointed out that the arrival of the EU's regional funding has been accompanied by a new bureaucracy for programme planning and fund allocation. The preliminary results of an evaluation study (Kuitunen and Oksanen, 2001) focusing on the effects of the EU Structural Funds on R&D activities and innovation policy in Finland suggest that only a small number of projects (5 %) aims at strengthening the R&D infrastructure. Instead, the majority of projects (72 %) concentrate on developing new products or processes. These observations contradict the assumption that the Structural Funds mainly develop the preconditions for carrying out R&D.

According to a study by Kuitunen and Oksanen (2001), the EU Structural Funds have enhanced the formation of networks not only between partners but also between different organisations and authorities. The co-operation has in general been good. One of the main results of the study was that the EU Structural Funds programmes have promoted more systematic innovation activities in the regions. There are, however, several obstacles for choosing and implementing strategic guidelines. Most problems are due to the complexity of the programmes and insufficient expertise on R&D activities among partners. Regarding the networking between organisations carrying out the R&D projects the most frequently mentioned problem was the differences between partners' commitment or their skills.

On the basis of the study, it can also be noted that the overall impact of the programmes has been significant. More than half of the R&D projects were considered as ideal. The EU programmes have brought significant additional value to the implementation of the R&D projects carried out in the regions. The projects have contributed to the core functions and development strategies of the participating organisations.

In Finland, regional administration has traditionally been relatively weakly institutionalised. Actually, the municipalities have broad autonomy, which is guaranteed by the constitution. Most of the essential development activities are carried out locally on the basis of inter-municipal co-operation and agreements.

The regional level played only a minor role in innovation policy until the 1980s. The Finnish innovation system has functioned on a sectoral basis, without specific orientation towards regional matters. However, several important changes influencing regional development and governance took place during the 1990s.

At the beginning of 1994, the Regional Development Act came into force. The main purpose of this Act is to guide the national regional policy. The Regional Development Act had significant effects on the structures of regional development and governance. The Act increased the importance of local government in regional policy by delegating power from central government to the regions. Another key effect was the establishment of regional governance on an economic-functional basis. Moreover, a programme-based regional policy was introduced in order to co-ordinate the actions of diverse regional organisations and actors.

Another legislative reform concerned the establishment of new regional employment and economic development centres (T&E centres) (FI 13). These centres are composed of the combined state regional offices, which represent the Ministry of Trade and Industry, the Ministry of Labour and the Ministry of Forestry and Agriculture.

Regional development programmes are drawn up under the Regional Councils, which co-ordinate and focus development work in the regions. They lay down specific targets and strategies for regional development, and are compiled jointly by the Regional Councils, the local authorities, the State regional administration authorities and other bodies.

Of the regional development programmes, the Centre of Expertise Programme supports regional specialisation and co-operation between different centres (FI 5). Finland is thus generating a strong, effective network of centres of expertise to meet the challenges of the information society in the 21st century. There are 14 regional centres of expertise and two nationwide networks carrying out the Centre of Expertise Programme for 1999-2006.

The most recent initiative in promoting regional development is the Regional Centre Development Programme which was launched in August 2001 and is administered by the Ministry of the Interior.

The Committee for Urban Policy is a government-appointed body which aims to create better conditions for the independent development of urban regions and to promote urban affairs in the State administration. The basic premise for urban development is economically, socially, culturally and ecologically sustainable development. The activities of the Co-operation Committee promote the co-ordination of rural and urban policies.

The Committee for Rural Policy is a partnership body set up by the Government on March 30, 1995 and appointed by the Ministry of the Interior with the brief of co-ordinating rural development programmes and promoting the effective use of resources targeted at the countryside. The Island Committee works to counterbalance the drawbacks of island life and to ensure the controlled utilisation of Finland’s unique coastal waters and the protection of their natural diversity.

1. Fostering an innovation culture

Finland's commitment to fostering an innovation culture can been seen in many cabinet-level decisions and policies aimed at improving the development of innovations in Finland. Presently, there are a few initiatives and measures taking place, but more can be expected in the wake of increased government funding for research.

1.1. Education and initial and further training

In 1998 the Ministry of Education initiated a programme to expand education and research to meet the growing and changing needs of the information industry (electrical and information technology, electronics, telecommunications and data processing technology). The programme is being implemented in the years 1998-2002. One of the goals is to increase the number of academic degrees in information industry fields by one third during 1999-2006. The programme also includes several ad hoc measures, some of which will involve industry participation. For instance, 23 companies participating in the programme conducted, together with universities, a study on new equipment needed in the sector. As a consequence of the study, the companies made a donation worth €8 million for the acquisition and updating of research equipment in the universities during the period 1999-2001. (Kangaspunta 2001). Education in the fields mentioned above grew rapidly already in the 1990s (the number of new students). From 1993 to 1998, university education related to the information industry almost doubled, and the education of the polytechnics almost tripled. In addition, adult education and further training was channelled to fields linked to the information industry.

The new programme aims at continuing and intensifying the earlier development. It covers the graduate and postgraduate education of universities as well as the education given by polytechnics. The programme helps to solve the acute needs of the industry, but it also permanently increases the supply of highly educated workers. A fairly big proportion of the students are being recruited from neighbouring fields. They are given suitable additional education lasting for approximately two years. The total costs of the programme for 1998-2002 are around €250 million.

In May 2000 the government decided to make an additional appropriation of about € 170 million for universities, polytechnics and the Academy of Finland, and for content production. The sum is taken from the government's so-called "future package", which consists of the incomes derived from the privatisation of state-owned companies. €90 million of the sum was directed to university core funding in the years 2001–2003. Recently, the government has introduced a new programme to gradually increase the universities' core funding by €90 million between now and 2004.

A large reform project concerning the polytechnics started in 1991 and ended in August 2000, when the rest of them received permanent status. There are 29 polytechnics under the administration of the Ministry of Education and last year there were 96,500 students participating in degree programmes in polytechnics.

The latest statistics show that during the 1990s the number of persons who completed tertiary education increased on average by three percent a year. During the period 1989-1998 the proportion of women in the population who completed tertiary education rose from 52 percent to 56 percent. At the same time the proportion of such people with a doctorate rose from 19 percent to 29 percent. (Statistics Finland 2001)

1.2. Mobility of students, research workers and teachers

Even though the mobility of personnel is considered to be one of the most important mechanisms of knowledge transfer, mobility between the universities and the business sector has been more modest than expected. Thus, the Science and Technology Policy Council recommended in its 1996 review the promotion of expert mobility and the intensification of its monitoring (Science and Technology Policy Council of Finland 1996).

Overall, the mobility of highly educated personnel increased during the 1990s. During 1998 nearly one in four highly educated employees changed job (compared to 17% in 1992). The mobility of educated research personnel was slightly higher, being clearly highest in the ITC sector. (Statistics Finland 2001).

According to the latest survey on the significance of measures aimed at increasing personnel mobility between industry and science, the most significant factors have been long-term relations between companies and universities in graduate mobility, co-operation in graduate education between universities and industry (e.g. joint supervision of doctoral and master's theses), and co-ordinating structures for considering the requirements of industry in university education programmes. Additionally, many doctoral and master's theses have been funded by industry in Finland.

However, according to the respondents in the private sector, the mobility of researchers is presently "not effective". Besides a lack of effective programmes for the promotion of mobility, the major limiting factor was said to be disparity in earnings. Although the respondents from the science sector mentioned that mechanisms for research mobility are under active development in universities, mobility was thought to be, at present, a rather uncommon way of collaborating with industry. (Kangaspunta 2001).

1.3. Raising the awareness of the public and involving those concerned

The need for promoting better awareness of inventive and innovative activity has been recognised on a general level in recent evaluations. One concrete measure aimed at raising the awareness of R&D and innovation among the public is the organisation of various competitions and prizes for successful new and fast-growing firms, inventors, or innovators. The most significant is the INNOSUOMI initiative. The basic mission of INNOSUOMI is to promote an innovative culture, to promote innovations and the creation of new companies, and to improve co-operation between entrepreneurs, funding organisations and the public sector. The INNOSUOMI prize is awarded annually in recognition of exceptional innovation and entrepreneurship. The President of the Republic is the patron of the award, giving it high visibility and prestige (http://www.innosuomi.fi/2001/prespalken.html).

1.4. Fostering innovative organisational and management practices in enterprises

The promotion of innovative organisational and management practices in enterprises was taken into the Finnish government program in 1996. This resulted in the Finnish National Workplace Development Programme (1996-99) co-ordinated by the Ministry of Labour. The aim of the programme is to boost productivity and the quality of working life by furthering full use and development of employee competencies and innovation in Finnish workplaces. The programme aims to achieve this by developing human resources and helping the

workforce to reform their modes of operation. The programme will be continued in the years 2000-2003.

The rationale for this initiative was the recognition that the development of organisational practices is an essential part of developing the national innovation system. In particular, the programme was established to help business enterprises to better adapt to the ever-changing environment and therefore promote productivity and employment. The research-assisted development programme aims to:

- support workplace-initiated projects
- speed up initiatives at the level of the workplace
- boost the use of research in developing working life
- create and maintain co-operation networks to disseminate and build up knowledge and competence
- increase international information exchange

One of the key features of this National Workplace Development Programme is its focus on network collaboration. The programme strives to promote networking in labour administration internally, between the various projects of the programme, and with the scientific communities both at the national and international levels. The programme also strives to achieve close co-operation with the main bodies funding research and workplace development in Finland, such as the Finnish Work Environment Fund, the European Social Fund, the Academy of Finland, and the National Technology Agency.

The government allocated approximately €18 million for the first programme implementation over a three-year period. In addition, the programme was chosen as one of the cluster programmes (FI 8) and got additional funding through that initiative. The second programme period started in 2000 and will last through to 2003. The number of proposals applying for the programme has risen during the beginning of the second period. The annual expenditure will be approximately €7 million throughout the second period.

1.5. Public authorities and support for innovation policy makers

One continuing task of the Science and Technology Policy Council is to enhance and develop sectoral research in Finland, the use of the knowledge generated in public research organisations, and the links between the various organisations co-ordinating and funding such research within the system of innovation (i.e. the universities, the Academy of Finland, the Technical Research Centre of Finland, other public research organisations, the ministries and the National Technology Agency). This task has recently given rise to a number of evaluations of various research organisations and institutes, in line with a similar trend in other European countries. (Science and Technology Policy Council of Finland 1999, 2001a.) Recently, a particularly important evaluation was published on the effectiveness of the programme for additional R&D funding (FI7). In the report the evaluation group listed six recommendations as future priorities:

- Policymakers should continue to set ambitious aims for research funding
- The conditions for basic research should be strengthened
- The cluster approach should be improved and extended

- The new and the old economies should be integrated
- More focus should be placed on innovation
- Future work force competencies should be developed

The Ministry of Trade and Industry's report Industrial Policy in New Economy recognises the assessment's positive conclusion on the additional appropriation programme. Therefore, it is proposed that public R&D funding should be taken care of in order to create conditions for the continuous development and creation of new competitive business activities. It once again states that Finland's national innovation system is among the best in the world. The main strength is the collaboration between authorities, research institutes and companies. However the systems need to be constantly improved in order to maintain national competitiveness. (Ministry of Trade and Industry 2001)

In autumn 2000 the Ministry of Trade and Industry took up the initiative of the Science and Technology Policy Council, concluding that there was a need to assess the present foresight practices in order to ensure that they will meet the future needs of society. The assessment report was completed in February 2001. It suggests that a clear institutional framework in the form of a foresight secretariat is needed to promote and support foresight exercises, and to better co-ordinate the diverse activities contributing to forward-thinking. The Ministry of Trade and Industry has recently formed the secretariat for co-ordination of foresight exercises. The secretariat also co-ordinates research projects which support implementation of coming foresight activities.

A working group set up by the Ministry of Trade and Industry has stressed in its report the need to raise the awareness of public sector officials regarding the importance of innovation and technology (Ministry of Trade and Industry 1999). It also stressed that the promotion of inventions and innovations is one important key objective of the various organisations and institutes active in sectoral research. It was also proposed that these should develop their own explicit innovation strategy to meet the proposals given by the working group.

1.6. Promotion of clustering and co-operation for innovation

The extension and deepening of network co-operation is seen as one of the key questions in the development of the innovation system in Finland. A number of projects and initiatives have been created in Finland to promote the transfer and utilisation of knowledge. There are two major initiatives to promote intra-sectoral collaboration in particular. The first, the Centre of Expertise Programme (FI 5), is a national measure aiming to enhance regional competitiveness by strengthening innovation, renewing the production structure and creating new jobs within the expertise areas selected. The second initiative, the cluster programmes (FI 8), aims to support R&D that strengthens industrial clusters. Cluster programmes are funded out of the programme for additional R&D funding (FI7). The aim of these cluster programmes is to transfer and accumulate knowledge in chosen fields by promoting co-operation among various actors, including both the users and producers of knowledge.

In its assessment of the additional appropriation for research, the evaluation group found that the cluster programmes have already initiated some productive co-operation. The report also points out that development needs for the programmes seem evident; more focus should be given to the objectives, co-ordination between financiers should be improved, and the reporting requirements are too complex. As a conclusion, the evaluation group recommends

that clusters should be extended to new areas and that the existing clusters need to be more focused. (Prihti et al. 2000).

2. Establishing a framework conducive to innovation

Recent efforts aimed at the establishment of a general framework conducive to innovation in Finland are interrelated with the general quantitative upgrading of R&D efforts during the 1990s through the government decision to raise research expenditures. Apart from this relatively new measure, there has recently been noteworthy activity in the field of IPR. Other measures are of a more ongoing nature, most notably innovation financing by Tekes, Finnvera and Sitra.

2.1. Competition

No specific measures.

2.2. Protection of intellectual and industrial property

During recent years a lot of committee work has been done on IPR issues in the university sector. The most recent report prepared by a committee of the university rectors 1999-2001 proposed that a network of IPR support services covering every university should be formed. Some concrete measures from the proposed model have already been implemented during the committee work. It is hoped that these actions will be a solid basis for structuring a coherent IPR issue policy in each university.

The committee report has been delivered to the Ministry of Education, and the next step will be to set up a committee in the Ministry of Trade and Industry. Its tasks will include clarification of the legal issues that would enhance the overall framework for innovative activities and their establishment as a third basic task of the universities along with education and basic research.

One concrete measure relating to the transfer of technologies from universities and research organisations to the market has already been enacted. The focus is on licensing and the management of IPR at the universities (FI 10).

In 1998 an international evaluation was conducted on the promotion of independent inventions and their commercialisation (Zegweld et al. 1998). Among other things, it was recommended that there should be more coherence and networking between the organisations involved in the promotion of inventiveness/innovation – Tekes, Sitra and the Academy of Finland – and that inventors and research organisations (including universities) should be given full responsibility for their inventive activities, including the commercialisation of research results. The costs of these activities should form an integral part of the costs of research. It was also envisioned that supporting organisations, including those in the private sector, should play a more important role as providers of high value-added services in matters related to IPR.

Recently, the Academy of Finland has published, on their web pages, a guide for researchers on IPR (http://www.aka.fi/).

The Ministry of Trade and Industry's fortcoming report Industrial Policy in New Economy suggests that the Finnish IPR system should be developed in line with international requirements. (Ministry of Trade and Industry 20019

2.3. Administrative simplification

A major initiative aimed at administrative simplification was launched in 1997 by merging the regional units of three ministries (the Ministry of Trade and Industry, the Ministry of Labour and the Ministry of Agriculture and Forestry) into Employment and Economic Development Centres, or so-called TE centres (FI 14). Altogether there are 15 TE centres, covering the whole country. Their main task, in relation to innovation policy, is to provide support and advice to SMEs in the different phases of their life cycles (http://www.te-keskus.fi/). Nonetheless, it is still unclear as to what degree they will take this role in the regions. The Employment and Economic Development Centres (FI 14) are also implementing in their own operating areas the Government's Entrepreneurship Project, which was launched at the beginning of 2000.

2.4. Amelioration of legal and regulatory environments

No specific measures.

2.5. Innovation financing

A major increase in innovation financing was introduced in 1996 when the Cabinet Economic Policy Committee decided to increase government research funding to raise the national research input to 2.9% of GDP by 1999. This increase has been realised through the programme for additional R&D funding (FI 7). The additional appropriation of €250 million has been targeted mainly at activities initiated by Tekes and the Academy of Finland (the Science and Technology Policy Council of Finland 1996). The goal of 2.9% was achieved and even exceeded in 1999, and the Science and Technology Policy Council has suggested that government research funding should be increased during the years 2000-2004 at a rate which corresponds to the estimated growth of GDP. This would indicate an annual development of about €50 million. The estimated public research expenditure in the years 2001-2004 would be 1.04% of GDP.

According to the assessment of the additional appropriation for research published in December 2000, the programme for additional funding has had a positive impact on private research investments, and the increased input has led to the growth of corporate profitability, a rise in the know-how level of personnel, and a large number of product innovations. Also, the effects of research input on employment have been clearly positive. The evaluation group recommended, among other things, that policymakers should continue to set ambitious goals for research funding. (Prihti et al. 2000).

In Finland, Tekes is the most important public provider of finance for technical R&D. In 2000 Tekes had €370 million available to fund R&D projects. Industrial R&D represents more than 60% of Tekes R&D funding. This is provided in the form of grants, loans and equity loans. The remaining 40% is used for national technology programmes and other applied technical research projects. The most recent Tekes financing instrument is equity loans for companies' product development activities (FI 4). This funding is directed especially at starting and growing technology-intensive SMEs. The share of Tekes can be 25-50% of the equity,

although it might be higher for smaller firms. The loan is typically directly related to a specific R&D project aiming at an innovation (http://www.tekes.fi).

The evaluation report on additional appropriation for research published in December 2000 stressed several factors concerning the development of Tekes: Tekes' efforts to extend its expertise base should be endorsed, the concept of innovation should be better understood, and greater resources should be applied to assisting commercialisation early in the process (in the product development phase). It was also acknowledged that Tekes reaches dynamic businesses well, but conventional small enterprises poorly. (Prihti et al. 2000)

In addition to Tekes' activities in the field, there is the Finnvera Small Loans Programme (FI 2) (Finnvera was formed at the beginning of 1999 through the merger of the activities of Kera and the Finnish Guarantee Board, FGB). The small loans programme is a financial product suitable for small operating businesses and for start-up businesses. The programme promotes the creation of new enterprises and jobs. Another noteworthy measure is the Sitra Matching Services, which involves the matching of investors and growth companies in need of innovation financing and other types of investment (FI 3).

At the beginning of 2000, the Ministry of Trade and Industry launched an Entrepreneurship Project, which is included in the Government's Programme. The objective of the two-year project is to set up new businesses and to increase the growth and competitiveness of enterprises. There are nine ministries involved, while the Employment and Economic Development Centres (FI15) and various interest groups in the business sector also play a key role in this project. The project consists of more than a hundred concrete measures that will be focused on those stages of the life cycle of an enterprise that are the most critical in terms of the enterprise's success. The Employment and Economic Development Centres will also implement entrepreneurship projects (FI14) of their own within their own operating areas. (http://www.vn.fi/ktm/eng/1/yhanke/yhanke.htm).

The Entrepreneurship Project was ranked highly in a international study which compared entrepreneurship projects in several countries. The Finnish project was acknowledged for its multi-sectoral emphasis and wide aggregation of measures.
(http://eu2001.se/industry/eng/docs/entrepreneurship_policy_report.pdf).

2.6. Taxation

For some time in the late 1980s there was a tax concession for R&D in Finland. However, the authorities abandoned the mechanism very quickly. The authorities had come to the conclusion that the benefits of the tax concession were not high enough compared to the administrative and other costs of the mechanism. One reason was also the fact that at that time Finland was trying to simplify taxation, which resulted in the exclusion of all kind of concessions.

3. Gearing research to innovation

Again, the most visible developments are related to the government's decision in 1996 to increase funding for research to 2.9% of GDP by 1999, and to the recommendation of the Science and Technology Policy Council that public research expenditure should be 1.04% of GDP in the years 2001-2004. As has been mentioned, most of this funding has been allocated to Tekes and the Academy of Finland in order to strengthen their ongoing activities. Apart from traditional forms of support, such as innovation financing through R&D loans and subsidies, more diverse measures have been enacted within the programme for additional R&D funding both inside and outside that programme. This concerns, in particular, the start-up of technology-based companies and the promotion of co-operation and clustering.

3.1. Strategic vision for research and development

The strategic visions for R&D are spelled out in the triennial reviews of the Science and Technology Policy Council, mentioned in Chapter 1. The latest review (year 2000) focused on the tasks and challenges of the public sector in the promotion of science, technology and innovations in the globalising economy. The emphasis has been on developing knowledge-intensive sectors in the economy in general, and in the field of ICT and related services in particular. Apart from increasing the funding of research, one more general action towards this end has been the establishment of the National Committee for Information Society Issues and the 50-member National Information Society Forum in 1996 (Science and Technology Policy Council of Finland 1996).

In the field of technology foresight and technology assessment, the strategic visions in the public sector partly stem from the Ministry of Trade and Industry and partly from Tekes. The Ministry of Trade and Industry published a first preparatory report in 1997, with the aim of drawing up general guidelines for technology foresight based on the needs and opportunities of different industrial clusters in Finland (The Ministry of Trade and Industry 1997). In autumn 2000 the Ministry of Trade and Industry took up the initiative of the Science and Technology Policy Council, concluding that there was a need to assess the present foresight practices in order to ensure that they will meet the future needs of society. The assessment report, which was commissioned to Prof. Ahti Salo, Systems Analysis Laboratory at Helsinki University of Technology, was completed in February 2001. It suggests that a clear institutional framework in the form of a foresight secretariat is needed to promote and support foresight exercises, and to better co-ordinate the diverse activities contributing to forward-thinking. The main reasons for this are the fragmentation of foresight activities, increasing EU pressures with regard to explicit foresight studies, and the increased complexity of technological and societal developments (Salo, 2001b). The vulnerability of the Finnish economy based on the present strengths (communication technologies and wood-based industries) puts some additional pressures on developing the foresight practices.(ESTO C+ "Monitoring European Foresight Activities", Deepening Report, Finland, Annele Eerola, VTT Group for Technology Studies, March 2001).

Following the suggestions presented in the report the Ministry of Trade and Industry has recently formed the secretariat for co-ordination of foresight exercises. The secretariat also co-ordinates research projects which support implementation of coming foresight activities.

Tekes has communicated its visions at the branch level in a biannual publication, which was last published in 1998 (Tekes 1998). The report covers mega-trends and Finnish development

in the field of ICT, chemicals and biotechnology, engineering and environmental technologies in order to provide background information for policymakers and firms.

The Finnish Parliament has assumed a role in the discourse through the establishment of the Committee for the Future in 1996. The committee received permanent status in March 2000. So far, the Committee for the Future has commissioned two technology assessments, one in the field of plant gene technology and the other in ICT (http://www.eduskunta.fi/). Work on other topics, including gerontechnology, knowledge management and energy technologies, is underway. A notable feature of future-oriented R&D is the initiative of the Academy of Finland on science watch, in which leading scientists are brought together in a series of exploratory workshops to consider prospective challenges. Furthermore, the Academy of Finland is involved in a process called "global science", in which international high-level experts and officials discuss consequential trends in science and technology (http://www.aka.fi/index.cfm).

3.2. Strengthening research carried out by companies

This field has been covered already in Chapter 3.5 in particular, since innovation financing measures and the strengthening of research carried out by companies are not really regarded as different issues in Finland, especially in the case of smaller firms. The cluster programme, discussed in Chapter 3.4, can also be considered relevant in this context. The same is true of funding coming through the EU Structural Funds and the framework programmes, insofar as they provide complementary funding for ongoing R&D projects.

3.3. Start-up of technology-based companies

Initiatives aimed at the start-up of technology-based companies primarily relate to the venture capital industry and various incubator schemes. The Finnish venture capital industry has been relatively underdeveloped, but in the 1990s the number of venture capital companies increased significantly, and today the Finnish Venture Capital Association has 30 full members and some 25 associated members (http://www.fvca.fi). During 2000 the members of the association gave funding to nearly 300 companies and the total amount of investments increased by nearly 40 percent to nearly € 400 million. For instance, the early stage investments increased by 19 percent to nearly € 77 million, start-up investments by 11 percent to nearly € 43 million and seed-stage investments by 7 percent to over € 26 million. The most significant public venture capital organisations are Sitra and Finnvera.

Sitra had a significant role in the establishment of the Venture Capital Association in 1990. Sitra's own activities include technology transfer and venture capital investments in emerging and technology-based start-up companies as well as spin-offs from large companies. Almost 39% (€18 million) of all Sitra's investments were seed-stage investments in 1999. Sitra accounts for 84% of all seed financing (GEM). This position will be further strengthened by a new measure launched jointly by Tekes and Sitra in May 2001. The measure is called PreSeed Finance(FI3) and it aims at improving the conditions for the commercialisation of technology projects and opening venture capital funding for companies that use innovative technology.

Although Sitra mainly invests in share capital, other equity-related or complementary forms of finance are also possible. The funds are channelled directly to the companies or through a regional network of partners, which have recently become integrated with Sitra's activities. (http://www.sitra.fi) Finnvera's domestic development and financing solutions are particularly

geared towards SMEs and help to promote regional policy objectives as well (http://www.finnvera.fi).

The incubator schemes (FI 1) have been established in close association with the regional technology parks and universities since the late 1980s. In the mid-1990s, there were some 15 incubator schemes in Finland. The more significant ones include the Spinno scheme in the Helsinki region and the technology or company centres in the larger cities of Tampere, Turku and Jyväskylä. Another scheme of relevance is the TULI scheme, which aims at transferring the results of research projects to new ventures and start-ups for commercialisation (FI 6). The TULI scheme functions on a project basis, also in close association with the regional technology parks and universities. (Peth & Mäkinen 2001; Ahola & LaPointe 1996.)

The increasing role of venture capital in the commercialisation of innovations and the increase of entrepreneurship is recognised in a forthcoming Ministry of Trade and Industry report on industrial policy – as is the role of both national and regional initiatives in the field.

3.4. Intensified co-operation between research, universities and companies

Close co-operation between companies, research organisations and universities is often considered a special strength of the Finnish system of innovation. The single most important ongoing activity within this field has been Tekes' national technology programmes (FI 12). The technology programmes aim at gaining new technology expertise and product development options in the important business areas of the future. The programmes also offer good frameworks for international R&D co-operation.

The technology programmes are demand-oriented in the sense that they have been planned with the needs of companies in mind, and have been implemented in collaboration with companies. The planning takes place in workgroups and seminars involving firms, universities and research organisations, and the explicit aim of the programmes has been to promote collaboration between these parties. Each programme has a steering group, a co-ordinator and a representative from Tekes. Universities of technology and the Technical Research Centre of Finland (VTT) have led most of the programmes. The duration of the programmes ranges from three to five years and their average volume ranges from €5 to hundreds of millions. Tekes usually finances about half of the costs of the programme. The programmes have also functioned as good frameworks for international R&D co-operation, e.g. within the EU's framework programmes. In 1999, over 60 programmes were under way.

Many of the completed programmes have been assessed by foreign evaluators. The main benefits lay in the close co-operation between research institutes and industry, the widespread involvement of small and medium sized companies, and the high level of international co-operation. (http://www.tekes.fi/eng/technology/default.asp)

Apart from Tekes' ongoing technology programmes, the cluster programmes (FI 8) represent the most recent developments. The cluster programmes have been in operation since 1996, and they are funded out of the programme for additional R&D funding (FI 7). The cluster programme aims at supporting R&D that strengthens industrial clusters by promoting co-operation in certain industrial fields, or around certain themes. According to the evaluation published in December 2000, there are some signs of success, although it is too early to project any final results (Prihti et al.2000).

Moreover, there are various regional initiatives and schemes which concern the establishment of framework conditions conducive to innovation, most notably the Centre of Expertise Programme (FI5; see Chapter 3). Part of the R&D funds channelled e.g. through the TE centres (FI13) finance co-operative R&D projects. The EU's Structural Funds, in particular the objective 2 RTDI funds and measures, also play an important role since they are typically integrated into regional projects of domestic origin.

3.5. Strengthening of the ability of companies, particularly SMEs, to absorb technologies and know-how

The SMEs are an important target group for most policy measures, not least for those aiming to strengthen research carried out by companies and co-operation in general. In a recent assessment of the additional appropriation (concerning FI7 and FI8) for research, the international evaluation group set as a future priority the encouraging of SMEs operating in conventional sectors to take up new technology (Prihti et al. 2000).

However, more specific measures aimed at enhancing the absorptive capacity of SMEs have recently been initiated by Tekes. Of these, the Technology Clinic Initiative and the Technology Strategy Consulting Services for SMEs are among the more coherent ones. Both measures have been evaluated recently. (Autio & Wicksteed 1998, Autio et al. 1998.)

The Technology Clinic Initiative was launched in 1992 to deal with technology transfer to SMEs (FI 11). The main purpose of the initiative has been to promote the adaptation of specified technologies for problem solving in SMEs in order to introduce new technological possibilities and to raise their awareness of external R&D resources. There have been 16 Technology Clinics in operation since the initiative was launched, involving some 250 SME assignments. In each clinic, there are four organisations involved: the customer SME, Tekes, the clinic co-ordinator and the technological service provider. There are at least six generic types of clinics, focusing on issues ranging from the diffusion of specific technologies (e.g. surface coating), regulatory problems (e.g. related to property rights), management practices (e.g. technology management), and the demonstration of new methods (http://www.tekes.fi, Autio & Wicksteed 1998).

The Technology Strategy Consulting Services initiative is less significant, and focuses on technology management and strategy within SMEs. The main tools for creating and stimulating strategies include MINTs (Managing the Integration of New Technology) and IMTs (Innovation Management Techniques). The objectives of the MINT initiative, launched in 1994 as a part of the SPRINT programme initiated by the DG XII of the European Commission, has been to promote the application and management of new technologies by SMEs, such as the use of technology analysis and systematic product and process development. The IMT initiative was launched in 1997 and has covered two alternative strategic development modules: one aimed at all SMEs and the other aimed at NTBFs. Both initiatives are service-related measures involving the provision of expert advice. (Autio et al. 1998.)

4. List of TREND CHART measures

New code	Title	Start/end dates	Action plan(s)	Status*
FI 1	SPINNO–Business Development Centre	1990/ continuous	I.1, I.4, II.2, II.5, **III.3**, III.4, III.5	Old
FI 2	FINNVERA Small loan programme	1996/ continuous	**II.5**, III.3	Old
FI 3	Matching Service	1996/2001	**II.5**	Ended; activities incorporated into PreSeed (FI3)
FI 4	Capital funding for companies' product development activities	1996/ continuous	**II.5**, III.2, III.3	Old
FI 5	Centre of Expertise programme	1994/2006	I.1, **I.6**, II.5, III.3, III.4	Old
FI 6	TULI scheme	1993/ continuous	II.5, **III.3**, III.5	Old
FI 7	Programme for additional funding	1997/1999	I.6, **II.5**, III.2, III.4	Evaluated by Prihti et al. 2000
FI 8	Cluster Programme	1997/2004	**III.4**, I.6, II.5	Evaluated by Prihti et al. 2000
FI 9	Improving the use of research results at universities	1999/2001	**II.2**	Old
FI 10	Technology transfer from universities and research institutions	1999/2001	**II.2**, III.4	Old
FI 11	The technology clinic initiative	1992/ continuous	**III.5**, I.4, III.2	Old
FI 12	Tekes Technology Programmes	1984/ continuous	III.2, III.4, III.5	Old
FI 13	**PreSeed Finance**	**2001/ continuous**	**II.3**	**New**

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6. New Policy documents

Policy Document Summary

Name:

Strategic development of ministries' sectoral research (Ministeriöiden sektoritutkimuksen strateginen kehittäminen). Available only in Finnish.

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Science and Technology Policy Council of Finland

Presentation of Analysis – main national strengths/weaknesses, problems addressed

The role of sectoral research was outlined in more detail in the Science and Technology Policy Council's recent statement (Strategic development of ministries' sectoral research) published in May 2001. The strategic role of the ministries has become increasingly knowledge-based, and sectoral policies need to be guided more on the basis of reliable research. This will entail integration of the ministries' research strategies and their steady demand-based updating. Overall, this means strengthening of the resources for sectoral research.

The strategic role of the Ministries is becoming more and more knowledge-based. Network-collaboration-based development and influence will further increase the importance of sectoral know-how. At the same time, the development of sectoral policy will be increasingly based on reliable studies and their efficient utilisation. The management of change will require ministries to constantly assess their own roles and integrate their research strategies to form collective development activities.

In most sectors of the administration this will require updating of the research strategy to emphasise demand, foresight and the impact assessment of the activities. In addition, both domestic and international networking should be strengthened in sectoral research. Programme-based research collaboration must be increased, especially by utilising the experiences and assessments gained from the cluster programmes. The structural barriers blocking collaboration, such as outdated acts, organisational barriers, and functional disadvantages caused by inappropriate division of duties, should be identified and removed. Also the recourses for sectoral research must be strengthened, by governmental appropriation, by increasing collaborative use of the recourses and by intensifying acquisition of the competed research funding from the open research markets.

Indicators – figures used, sources and benchmarks

The suggestions to carry on development activities (such as increasing functional collaboration between the research institutes), proposed in the previous (1999) Science and Technology Policy Council's statement on the development of sectoral research, are still relevant.

The Report on assessment of the additional appropriation for research (Prihti et al. 2000) indicated that the early signs concerning the impact of the cluster programmes seem to be positive and that the concept should be further developed and broadened.

Analyses of government appropriations in recent years reveal that the increase in research volume has been taken from the open research markets. This development should be continued; the challenge of ever-growing research markets can be reacted to only by increasing collaboration both in research and funding.

Objectives, time horizon, relationship to EU Action Plan (if any)

Assessment of the non-committed research funds of the ministries should be completed in all ministries by the end of 2002. The concrete development suggestions to the ministries made in the statement of the S&T Policy Council of February 1999 are still relevant. Their implementation should be actively continued in order to strengthen the national innovation system.

Implementation approach

There are some signs in the government appropriation for 2002 that international research collaboration, in particular, will be strengthened.

Reference/location/URL

http://www.minedu.fi/opm/asiantuntijat/tiede_teknologianeuvosto/tiede_teknologianeuvosto_kannanotot.html

Policy Document Summary

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Innovation policy guidelines: intelligent, learning and competitive Finland

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International economic and technological development strongly influences industry structures on national and regional levels, corporate business planning and the requirements of the labour force and society for know-how. This development can be influenced by innovation policy - by large, cross-sectoral and focused development of conditions for innovation activities. Functional and efficient national innovation systems and regional systems will become increasingly essential factors in creating economic growth and social welfare.

Finland has an extraordinary opportunity to take advantage of on-going developments. The economic conditions are still good, the employment rate has improved and unemployment has decreased. Investments in R&D activities have increased strongly especially in the private sector. Government has launched several measures which aim at enabling the public education and research system to develop at the pace of recent changes in society. A bill on improvement of the universities' core funding has recently been given to parliament. The decision in principle on the use of funds gained from the sale of state-owned property, accepted in the spring of 2000, and the measures connected to it are good examples of future-oriented investments. The public research investments carried out in the latter half of the 1990's have been productive and well allocated on behalf of the economy, employment and entrepreneurship.

The Science and Technology Policy Council considers that this successful development should be continued. New complementary and sharply focused development activities will ensure that the national innovation systems remain competitive. Development activities will be targeted at basic university level education and research, post-graduate education, the utilisation of research know-how and the improvement of conditions for entrepreneurship.

Objectives, time horizon, relationship to EU Action Plan (if any)

During 2002-2004, the core funding of the universities should be increased gradually by at least € 90 million as proposed by the government. The funding must be allocated especially to education and to the development of its basic constraints. Public R&D funding should be increased by 2004 to 1.04% of GDP, as the Science and Technology Policy Council has proposed.

Implementation approach

The planning, implementation and monitoring responsibilities of the measures proposed in the definition of the policy are divided between the Science and Technology Policy Council, the Cabinet Committee on Economic Policy, the Prime Minister's Office and the Ministries. In order to ensure appropriate allocation of

funding and other measures in the following years, the Ministry of Education and the Ministry of Trade and Industry must jointly take responsibility for implementing an independent mid-term assessment on use of the funding by the beginning of 2003.

Reference/location/URL

http://www.minedu.fi/opm/asiantuntijat/tiede_teknologianeuvosto/tiede_teknologianeuvosto_kannanotot.html