ENVIRONMENTAL CLUSTER RESEARCH PROGRAMME
- ecoefficiency, entrepreneurship and co-operation to create and utilise innovations

In the 1990’s, industrial clusters have been a major focus in the debate about the Finnish technology policy. In terms of industrial and technological policy, clusters are networks of enterprises and communities with similar interests. Clustering helps them to improve their operating potential and competitive capacity through co-operation. The key agents in clusters are the producers and users of knowledge: enterprises, the public and private service sectors, the public authorities and the research and educational system. The underlying foundation of clusters is a strategic competence network created through co-operation, where knowledge and expertise are disseminated effectively and combined innovatively. Clusters are often better representative of the operative structure of industries than the traditional division into lines of business.

The focus in industry is shifting from capital- and material-intensive to competence-intensive operations. This development has been especially fast-paced in Finland, where electronics industry now plays a major role among the exporting industries. But it is not only in modern information technology but also in other clusters that success seems to depend crucially on the ability of enterprises to utilise knowledge, expertise and modern information technology.

In Finland, systematic work has been done for years to build a national innovation system based on co-operation between the producers and users of knowledge. Cluster programmes are the most recent addition to this system.

CLUSTER PROGRAMMES

The Finnish cluster programmes form a set of public programmes that are organised under sectoral ministries. In the beginning, the programmes were scheduled for the period 1997-1999. They aim to produce new knowledge, competence, services and co-operation to promote entrepreneurship, economic development and employment. One important aim is to break down the barriers between scientific disciplines and lines of business and thereby to tap new sources of innovation. Cluster programmes are extensive research projects undertaken collaboratively across political sectors in an effort to integrate the objectives of research, technology and employment policies with the sector policies, including research and development projects conducted within enterprises and in the public and private service sectors.

Co-operative projects help to consolidate contacts between the researchers and the clients of research institutes and to promote co-operation between the public providers of funding. The development of clusters requires good co-operation both between the public and the private sector and within the public research community.
Up till now, cluster programmes have been launched in the environmental sector, but also in the traffic, forest, foodstuff and welfare sectors, and a working life development programme and a networking programme for SMEs have also been started. Most programmes rely significantly on modern information technology. Programmes incorporate more than 300 separate projects that are performed by more than 400 organisations. The financial volume of the programmes is more than FIM 600 Million of which circa 60 per cent is public.

ENVIRONMENTAL CLUSTER RESEARCH PROGRAMME

The Finnish Ministry of Environment is responsible for the administration of the programme. Certain aspects of implementation and funding are also undertaken by the Ministries of Trade and Industry, Agriculture and Forestry and Labour, TEKES (Technological Development Centre) and Academy of Finland.

Ministry of Environment provided 25 million FIM, Technological Development Centre 10 – 15 million FIM, Academy of Finland 6 million FIM and Ministry of Trade and Industry 1 – 3 million FIM. The total funding for the first stage of the programme (1997 – 1999) was 80 million FIM. Approximately half of the total was contributed by the research units and other financial institutions.

The funding proposals concerning individual projects are made by the steering group of the research programme, which consists of representatives of the financing organisation, Ministry of Transport and Communications and industries. About 500 applications have arrived, and 60 of them have so far been allocated funding.

The major Finnish environmental research institutes, including 170 research units and about 70 enterprises, are participating in the programme.

The extent of the programme and, even more importantly, the approaches of the research projects will make it possible to use research as a tool to orient environmental policies in a completely novel way.

AIMS AND CONTENTS OF THE PROGRAMME

The aim of the Environmental Cluster Programme is, by enhancing ecoefficiency, to improve the state of the environment and to create new jobs. The programme further aims to generate environmentally friendly innovations and product ideas. Another objective is to promote co-operation between researchers, business people, public authorities and funding organisations in accordance with the cluster approach and thereby to integrate environmental matters even more closely with the Finnish system of innovations.

The following topic areas will be covered by the environmental cluster research projects:

1. Material flows and life cycle accountability
2. Ecoefficiency of production processes and products
3. Environmentally friendly infrastructure
4. Management of environmental knowledge and information
5. Promotion of environmental business, ecological exports and marketing
6. Environmental and innovative policies

The management of material flows and life cycle thinking are special tools that can be used to promote ecoefficiency. They are also central aspects of the cluster programme. The environmental cluster research programme is the first effort to analyse material flows throughout the national economy. The life cycle projects will apply to agriculture as well as forest, metal and construction industries, electrical and electronic industries, water supply and natural stone industry.

ECOEFFICIENCY

Ecoefficiency is the key concept in the environmental cluster research programme. The principle of ecoefficiency connects environmental protection with technological and economic efficiency. The focus of environmental protection simultaneously shifts from emissions and waste to possibilities of saving the natural resources and energy and diminishing and preventing environmental hazards throughout the life cycle of the product. One basic aim of ecoefficiency is to eliminate the correlation between economic growth and increasing use of natural resources on the one hand and the increase of emissions on the other.

Emission statistics already show signs of differentiation between the growth of production and the development of emissions. In Finland, for example, effluent discharge from forest industries into the waterways continued to increase up till the mid-1970s, after which production has continued to increase, while effluent discharge has decreased.

The OECD survey of ecoefficiency underlined the conclusion that the target levels in ecoefficiency cannot be reached only by technical means, i.e. by developing new machinery and equipment or by improving the old stock. Social innovations are also needed: new ways to utilise products effectively, new types of co-operation, completely new lifestyles and new consumption habits. Any analysis of ecoefficiency must thus be based on the environmental load per service produced.

PRODUCT POLICIES AND INNOVATIONS

In international environmental policies, the focus is shifting from limitations on emissions to concern for the hazardous impacts of emissions throughout the product’s life cycle. Although many countries have been able to effectively cut down their industrial emissions, the use and disposal of various products appear to cause notably greater environmental problems than their manufacturing. Product policies have been discussed in the EU, OECD and the Nordic Council of Ministers.

The environmental cluster research programme aims to provide a solid knowledge base for Finnish product policies. The programme includes life cycle analyses in
different fields of production, surveys of the best available technologies and a material flow analysis of the entire national economy, which will allow assessment of the ecoefficiency potentials of different fields of production and the points in the production chain where ecoefficiency can be increased in the most cost-effective way.

The resulting knowledge base will make it possible for enterprises to target their product development optimally and for the environmental authorities to outline the environmental policies in such a way that they will both support high-level environmental protection and enhance the competitiveness of the national economy.

DEVELOPMENT OF ENVIRONMENTAL BUSINESS

One important feature of the environmental cluster is the major emphasis on the networking of researchers, funding organisations and users of research findings. The programme does not only aim to consolidate the knowledge base of environmental policies and to generate innovations, but also to strengthen the national system of innovations and to support the development of environmental business.

The programme includes projects that encourage co-operation between entrepreneurs who utilise the natural environment for eco-business and seek optimal operating strategies for enterprises specialising in environmental technologies. Two further projects will be undertaken to develop the methods of control through environmental policies to be more incentive to innovative strategies. In some projects the goal is to set up a new marketplace for environmental products in the Internet.

ASSESSMENT OF THE EFFICACY OF THE PROGRAMME

Most of the projects included in the first stage of the environmental cluster research programme will be completed in the spring of 2000, which is why the evaluation of the programme will be made during the autumn 2000.

But it is already quite clear that the goals set by the funding organisations have been attained. Co-operation has been flexible, and the number of co-operative projects has increased. The research institutes have also networked in a significant way. Each cluster project involves about 3 research units. This figure is certainly higher than the average. And 70 industrial enterprises are also participating. Most of them participate through a representative in the steering group of the research organisation; only a few projects are co-ordinated by industrial enterprises. One reason for this is that companies are reluctant to involve their R&D projects in a programme whose findings are public and freely accessible to potential users.

The programme is a significant educational forum for new environmental researchers and it allocates resources to areas where new knowledge is needed and new jobs and enterprises can be set up. The programme encourages cooperation between researchers and the utilisers of findings. The evolution of a new research culture enhances cooperation, the utilisation of research findings and efficacy as well as the acquisition of outside financing. This will serve to increase the share of non-governmental research funding for the units.
CONTINUATION OF THE PROGRAMME

The Environmental Cluster Research Programme is continuing in 2000. The following pilot studies have been launched to elaborate the plans for further research:

1) Infrastructure of sustainable society
2) Information society and sustainable development
3) Environmental effects of hormone-like substances - need for national research

The planning of the second stage of the programme rests on the fact that the public funding for the term 2000 – 2001 will be at least 30 million FIM. Based on the pilot studies, targeted invitations for applications have been issued for the items 1 and 2. The need for further studies on ecoefficiency has also been recognised.

A special emphasis will be placed on the subprogramme dealing with sustainable development and information society. So far, the main impact of the emerging information society on environmental protection has been the need to recycle and salvage electronic waste. The modern information technology, however, provides interesting opportunities to promote sustainable development.

In production, favourable environmental impacts mostly take the form of dematerialisation. The structure of industrial production will change: the significance of energy- and material-intensive industries will decrease, and the development of control systems in all production will allow products to be manufactured with less raw materials and less energy.

Consumption will be characterised by immaterialisation, i.e. material products will be replaced by immaterial ones. Sooner or later, all the products and services that can be marketed and delivered to the consumer in the form of information will be electronically marketable. Although the processing and transmission of information will always require a material carrier and a transmitted bit may leave a clear ecological footprint, we can still justifiably speak about increasing immaterialisation.

According to a pilot survey carried out by the environmental cluster research programme, we will need to know more about especially immaterialisation if we wish to aim at a sustainable information society, which has already been accepted as a national goal in Finland. Dematerialisation will proceed in industries even without new environmental policies, and projects related to it were already launched at the first stage of the cluster programme. Immaterialisation is more problematic in this respect; increasing consumption may well cancel out its environmental benefits. On the other hand, however, immaterialisation may open up major new opportunities if we are able to anticipate and utilise them in ways that benefit sustainable development. We will especially need to know more about the impacts of the development of information technology in the following fields: lifestyles and cultural changes, consumption habits, networking of consumers and trade in consumer goods, replacement of products with services and the management, processing and dissemination of environmental knowledge.