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SUPPORT SERVICES FOR INVENTIVE AND INNOVATIVE ENTERPRISES AND INDIVIDUAL INVENTORS

Document presented by Timo Kivi-Koskinen, President, Central Organization of Finnish Inventors' Associations, Helsinki (Finland)

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1. INTRODUCTION

The subject, "Support services for inventive and innovative enterprises and individual inventors" I am going to present, is a very complex one and, at the same time, very topical, since R&D and new innovations have more and more generally been seen as a major factor in improving the competitiveness of industry and the national economy and welfare as a whole.

Therefore, countries have adopted different methods to promote and support inventiveness and facilitate the exploitation of inventions. Since it is impossible in this short presentation to describe them all, I think I could best contribute to this Seminar by discussing with you, how today the Finnish system is facilitating inventiveness. The special reason for doing so is, that the Finnish system has undergone an intensive international assessment. The results of that study have been published only last Monday and at the end of this speech I can present to you some of the major findings and proposals of the report, which might be useful also for improving innovation support systems in other countries.

2. WHAT IS FINLAND ?

The population of Finland today is a little over 5 million. Finland is rightly known as a land of forests that cover roughly three-quarters of the country's surface area of 338,000 sq. km. Other outstanding features of Finland's scenery are its myriad lakes and islands. Finland is situated in northern Europe between the 60th and 70th parallels of latitude. A quarter of its total area lies north of the Arctic Circle. Finland is member of the European Union and its neighboring countries are Sweden to the west, Norway to the north, Russia to the east and Estonia to the south.

Finland has a typical advanced industrial economy: two-thirds of its total output is generated in the service sector. The net wealth of Finnish households is close to the average for the European Union. In 1996, Finland's GDP per capita was US$ 18,871, while the average for EU countries was US$ 19,333.

There are 20 universities or other institutes of higher education, with a total student population of 130,865 of whom 52% are women.

3. CHANGES IN THE FINNISH INDUSTRIAL STRUCTURE

Because of radical industrial development, there has been over the past 35 years considerable changes in the Finnish exports. The wood products, paper and graphic industry sectors accounted for some 70% of Finnish exports in 1960. This percentage dropped to some 30% (of a much larger export package) in 1997.

Over the last 10-year period, Finnish high technology export has increased from some 1 billion US dollars in 1988 to 7 billion US dollars in 1997.

R&D and new inventions have been a major driving force in this development. The objective of both quantitative and qualitative increase in R&D is to turn results of basic science

into commercially useful goods and services and thereby to increase the export and improvement of employment.

Industry is of course the key factor in this process. Because of Finland's size and, at that time, its relatively small and thin industrial structure, all the results coming from the R&D system were not possible to be absorbed by only the Finnish economy. Hence, there has been a radical process to extend the industrial structure through upgrading of SMEs and promotion of new start-up companies, formation of industrial clusters and also through new international alliances.

The role of new patented inventions in this process is remarkable. The number of domestic patent applications filed per year increased from 926 in 1967 to 2,415 in 1997, or a growth of 160 %. Even more important than the growth, is the area of technology from which new inventions emerge. The move from traditional engineering to electronic and biotechnology has been considerable.

It is fair to say that inventions guide the development of industry, but at the same time, a good question is who is guiding the inventors who are behind every invention. We really should improve the dialog between industry, inventors and the society as a whole, to improve the competitiveness of the industry and the sustainable welfare of human mankind. The better the real problems are known by inventors, the better they can focus and concentrate to solve them.

According to Professor Michael Porter's recent analysis, the present stage of economic development in Finland can be described as "innovation driven". In this stage, firms not only appropriate and improve technology and production methods acquired from abroad, but also create them by themselves. Indigenous firms push the state-of-the-art, in product and process technology, marketing and other aspects of competition.

Favorable demand conditions, revelant R&D institutions both public and private, and the presence of related industries in the country will, at this stage of development, allow people in firms to innovate and companies to sustain innovations and to develop commercially viable goods and services from them.

In the 1990s, the R&D system has been actively developed by the public and private sectors in partnership. There is an awareness in different parts of society of the growing role of R&D in the cultural and structural change of the industry and the economy as a whole.

In addition, R&D is seen as an important instrument in other policy areas such as energy, environment, communication, social welfare and public health. Systematic R&D based on new inventions is also an essential instrument for sustainable development, which should be the major goal of all mankind.

As a result of that, the structure of Finnish industry has changed and diversified considerably, especially during the last ten years. A technology intensive electronics and electrotechnical industry, a good example being Nokia, has emerged beside the more traditional forest, metal and engineering industries, creating tens of thousands of new jobs and growing export surplus.

Encouraging growth, employment and export prospects are forecasted for this sector, and its both direct and indirect impact on Finnish business as a whole and national welfare in general is considerable.

4. SOME MAJOR CHANGES WITHIN THE NATIONAL SYSTEM OF INNOVATION

4.1. QUANTITATIVE CHANGES IN R&D EXPENDITURE

Expenditure for research and development in Finland has increased from 2 billion US dollars in 1993 to around 3.2 billion US dollars in 1997, and is planned to further increase to almost 4 billion US dollars in 1999. Expressed in percentage (%) of GDP, the increase is from 2.21 % in 1993 to 2.72 % in 1997 and a planned 2.90 % in 1999.

Further increases are foreseen thereafter. The relationship between enterprise financing and state financing for R&D has fluctuated over the years between 60/40 % and 70/30 %.

4.2. QUALITATIVE CHANGES IN R&D

A number of qualitative changes have been introduced within the national system of innovation. These changes have been designed to upgrade the R&D system and to strengthen its scientific base. The Government has supported this movement by increasing the financial resources at Technology Development Centers, Tekes, the Academy of Finland and the Foundation for Finnish Inventions, which is a special agency for supporting private inventors and SMEs in the process from idea to invention and from invention to product and to the market.

5. PROMOTION OF INVENTION AND INNOVATIONS

5.1. THE INNOVATION PROCESS

The whole process from the invention through innovation to a profitable product and profitable business is usually very long, multiphased and complex. The content of an invention, the individuals or organisations responsible for the enhancement of the invention, cooperation partners, etc., may change many times during the process.

The innovation process is not always only a chain of successes; rather, the innovation process is full of technical, commercial and personal failures and hardships. All in all, the innovation process is characterised by chronic uncertainty and therefore it needs attention and both private and public support.

5.2. ACTORS IN THE INNOVATION CHAIN

As in many other countries, the Finnish system for the promotion of inventions and innovations is made up of public and private actors. They cover all stages of the innovation

process from the idea through evaluation, patenting and product development to the commercialization of an invention.

Traditionally, most of the actors have operated at a national level but, in recent years, the number of regional and local actors has increased. Still, the number of actors providing financing and other services specifically for SMEs and independent inventors is limited. The mainstream of financial support is aimed at the financing of research in universities, research institutes and product development in major firms.

Most public funds for technological research and development are channeled through Tekes (mentioned above). It also plays a key national role in coordinating international research and technology cooperation. In 1998, Tekes has 0.4 billion US dollars available to fund industrial R&D projects (in the form of aids, loans and equity loans) and technology-based national R&D programs. Industrial R&D represents approximately 60% of Tekes funding. The National R&D programs are used to promote developments in specific sectors of technology and industry and to efficiently transfer research results to production and business.

The TE-Centers, the regional public service units for business, were established in 1997, by merging services that were previously provided by the regional units of three ministries. There are 15 TE-Centers and they cover the whole country.

The main role of the TE-Centers is to deliver services in the form of financial support and advice to SMEs in the different phases in their life cycle. This includes the promotion of technological development and internationalization of companies. All TE-Centers offer a wide range of instruments from the establishment of a company to the analysis and development of its funding, viability and productivity. The TE-Centers are also active in promoting the creation and development of new enterprises. Because of their wide scope and geographical coverage, the TE-Centers have become important contact points also for private inventors.

6. THE FOUNDATION FOR FINNISH INVENTIONS

The Foundation for Finnish Inventions was established in 1971. Its legal status is that of a private non-profit foundation, but it is mainly financed by State subsidies channeled through the Ministry of Trade and Industry.

The Foundation for Finnish Inventions plays an important role as a special body supporting and promoting the early stages of technological innovations. The Foundation's principal activities consist of advising inventors on the development of invention projects by evaluating inventions and financing and promoting of the product development of inventions, including obtaining IPR for them and giving legal and marketing services to inventors and SMEs.

The Foundation is also responsible for the general advancement of the invention and innovation sector in Finland. It has 13 regional representatives in different parts of Finland. The Foundation's special expertise lies in the protection and evaluation of inventions. A unique feature of the Foundation is the fact that its financing is mostly granted to private individuals.

The Foundation for Finnish Inventions and its regional representatives annually receive some 8,000 requests for advice. They receive over 2,000 invention proposals and from this over 900 result applications for funding. Around 300 new inventions are actually funded annually. The Foundation has estimated that, approximately one of five projects is funded, while nearly 60 or 3 % of invention proposals are finally commercialized. The budget of the Foundation has grown from 3.2 million US dollars in 1995 to 5 million US dollars in 1998, but, compared with the needs, it should in the future be at least 10 million US dollars.

7. OTHER MEASURES RELATED TO THE PROMOTION OF INNOVATION

With regard to the other measures related to promotion of invention and innovation activities, the most relevant is the National Board of Patents and Registration of Finland (of the Patent and TM office). This Board grants patents or utility models to novel inventions and provides information and other services to inventors and to organisations involved in the promotion of innovation. The Foundation and the Board have jointly contributed to the organization of various innovation-related competitions and projects. The Board has quite recently started to develop cooperation with TE-Centers especially in providing patent information closer to inventors.

There are 16 science or technology parks in Finland. They all are active in their regions, not only in offering premises and technically developed infrastructures to companies and research organisations, but also in organising innovation programs and projects.

Many of the Centers of Expertise, which were initiated by the Ministry of the Interior, are now operated by the technology parks. The basic aim of the program is to support regional specialization, to enhance regional competitiveness and to increase the number of high-tech products, companies and jobs.

Most of the larger cities provide innovation services to enterprises and to inventors, either directly or in cooperation with other public or private organisations. Local incubator programs have recently been created on a similar basis.

An important underlying factor accelerating the growth of regional and local innovation schemes has been the availability of new funding sources, particularly the resources of the EU Structural Funds. This development has been supported by reforms in the structure of regional administration. The role of regional councils has been strengthened at the cost of central or nation-wide planning systems.

The role of the private sector in the promotion of innovation has been modest but has increased recently. There are now a number of venture capital companies, whose financing is primarily equity capital. These venture capital companies can also provide other support, such as the development of enterprises through their board of directors, providing international contacts and finding cooperation partners.

Last, but not least, one has to mention the important role of the Central Organization of Finnish Inventors' Associations (KEKE), and its 27 member Associations, with around 2,000 members (experienced inventors). The organization is promoting inventiveness and supporting

inventors. Experienced inventors are often the best and and most reliable help and support to the beginners.

The inventors and their organisations must carry the main responsibility for the inventive activity and the supporting organisations like the Foundation for Finnish Inventions should take the position as service organisations. One of the consequences of this is that Associations of private inventors research organisations, including universities, should have more resources to promote and support innovative activities and commercialisation of research results. Tekes, and other funding agencies, should allow these costs to be included in the R&D projects. The delivery of "value-added" services, dealing with the commercialisation of R&D results, should be seen as a new market for public and private organisations.

8. CONCLUSION

The whole system, as shortly described above, has been reviewed by a group of experts. Their report including many pros and cons was published on Monday of this week and I have the pleasure to share with you some of the major findings and proposals for improvement by these experts and what was discussed at the publishing event just before I left the country. I think these proposals form a solid basis for improvement of the Finnish system and can, at the same time, give guidelines also when developing systems in other countries. Since the report was secret until Monday, I have been unable to include the proposals in this paper, but have brought them with me and it and my personal comments are now available and can be discussed with you.

I hope that you have found interesting this Finnish example, the ideas and how it should be improved and that it gave you some new ideas, when you develop and improve inventions promoting and supporting systems in your countries.

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