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# 4 Experiences in the Fields of Innovation Services in Hungary at the Age of Millennium

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## 4.1 Introduction

The political changes in Hungary at the turn of the 1980s and 1990s induced social and economic changes. In the early 1990s the actors and the rules of economic life changed, which was a trauma not only for the individuals but also for the whole national economy as GDP, export, competitiveness and the standard of living decreased. By today the trauma of those years has ended and the economy is steadily improving (the annual average increase of GDP is about 4-5 %). The economic policy focuses on the competitiveness of the Hungarian economy in the European and World market

In this context innovation and technology transfer have an important role as determining factors of international competitiveness. In these fields the national economy and the individual actors (national and local governments, businesses, higher education institutions, research centres, business support organisations) are lagging behind the developed countries. Concerning businesses we have well-established national and multinational larger companies, which have already been active in innovation and technology transfer in the past years, while the majority of businesses are SMEs, which are much less developed and mainly-under capitalized and have no access to information. The academic institutions have the old structure and have management and human resource problems. The government policy has improved a lot in recent years, but it still does not draw up clear priorities or innovation and technology transfer support schemes. Business support organizations cannot provide services in this field.

In this paper we shall give a brief review of the actors of the Hungarian innovation market and we shall outline the problems and causes through the eyes of a private consultant.

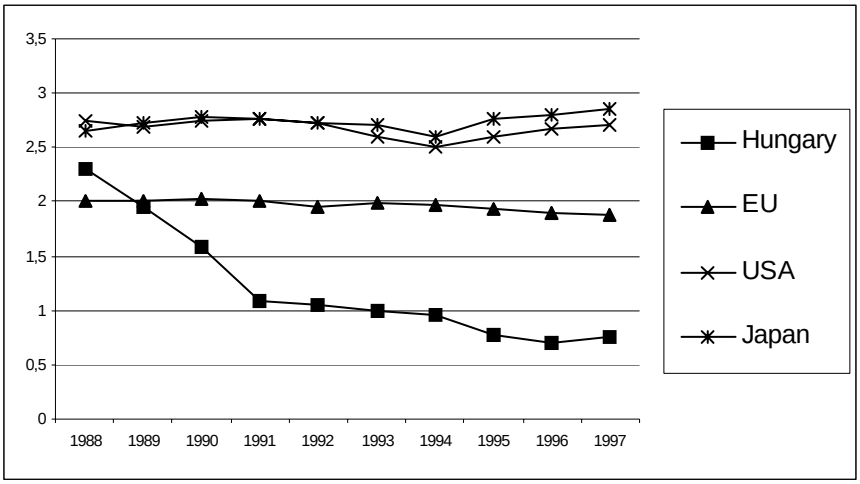
## 4.2 Barriers of local businesses

The structure of the Hungarian economy was dramatically changed by the political changes in the early 1990s (Török 1991). The large socialist companies

*This chapter draws on Mogyorósi, Vilmányi and Révész (2002).

were replaced by SMEs and major multinationals. Concerning economic and employment potential, SMEs have a determining role in the Hungarian economic development, therefore their innovation awareness and potential must be improved (Figure 4.1).

*Figure 4.1* The R&D expenditure of the Hungarian economy




*Source*: HCSO (1998)

According to this figure the Hungarian economy is lagging behind the developed countries (Table 4.1). The picture would be even worse if we take into account that SMEs have only 10-12 % share of the total R&D expenditure. The government is aiming increase R&D expenditure slightly above 1 %, which will then reach the lowest value of EU member states.

*Table 4.1* Changes in the competitiveness rankings of Hungary

| | **1995** | | **1999** |
|---|---|---|---|
| Macro economy | 41 | ⇒ | 17 |
| Financial condition | 43 | ⇒ | 28 |
| Human resources | 32 | ⇒ | 28 |
| Government policies | 42 | ⇒ | 26 |
| Infrastructure | 32 | ⇒ | 26 |
| Science and technology | 39 | ⇒ | 27 |
| Internationalisation | 37 | ⇒ | 17 |

*Source*: IMD (1995, 1999)

The reason for the low R&D expenditure of Hungarian SMEs is very complex, we shall provide some brief analysis:

(a) *Size and structure of enterprises*. The majority of Hungarian enterprises are micro-, and small enterprises, which are undercapitalised, their prime interest is only survival and they are unable to invest in any development. The ratio of middle-sized companies is small, though they have the largest innovation potential. This was the initial picture of the transitional economy. An SME development policy is needed, which would provide capital for development and a beneficial economic environment for innovation.

(b) *Activities of enterprises*. The ratio of enterprises in the service sector is much higher than in OECD countries. Those, which are in the production sector, can hardly get involved in the innovation chain or in subcontractor chains, and can produce only low added value, therefore their profitability is rather low. The geographical structure is also a barrier as we have innovative regions (Budapest and its agglomeration, major cities with knowledge centres and the Budapest-Vienna axis) but the other regions are lagging behind (Lengyel 2000a).

(c) *Mentality of enterprises*. The mental barriers can be listed as follows:
   - Local businesses are very individualistic, not ready for co-operation and have a low level of communication abilities and weak marketing activities.
   - Because of high taxes and the social security load they are not always ready to receive state funding.
   - Lacking language skills, low level of international communication and low level of internationalisation

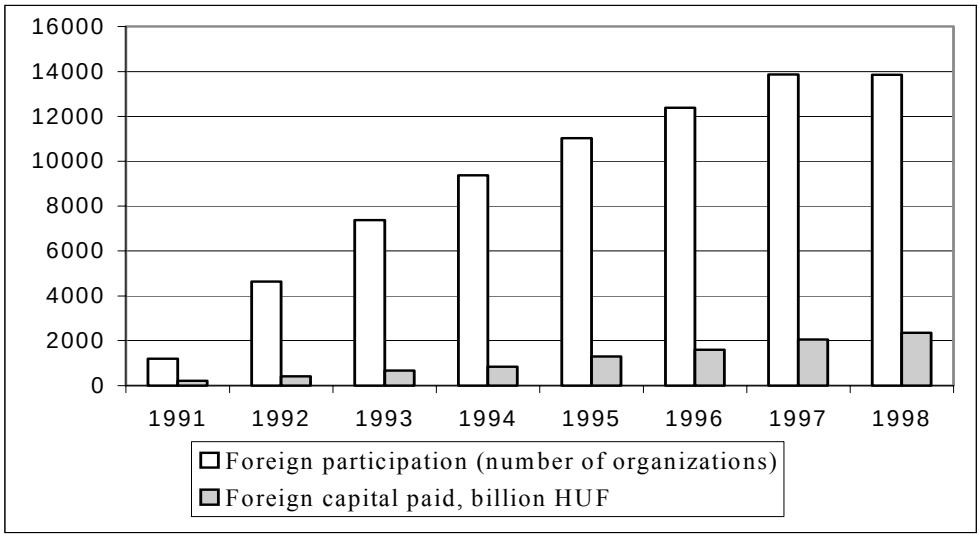
(d) *Financing of innovation related investments*. The financing institution system is segmented and information dissemination is not efficient. Innovation related loan systems have not been developed, there is a low level of investor activities, and mediators are lacking. Recent tax incentives encourage investments, especially innovation related investments.

(e) *Innovation strategies and implementing organisations*. The innovation support system has not been developed yet, so those organizations, which would be able to collect, process and disseminate innovation related information and to provide services are lacking (Buzás 2002). The development of regional innovation strategies started in 3 regions of Hungary in 2002, as they are beneficiary regions of the EU RIS/RITTS program.

## 4.3 Innovation behaviour of foreign investors

As a result of political and economic changes, interest of foreign investors rose in various sectors in CEE countries. In the 1990s altogether almost USD 20 billion foreign capital was invested in Hungary, which is very high among CEE countries and the highest per capita (Figure 4.2).

*Figure 4.2* Direct foreign capital investment in Hungary




*Source*: HCSO (1998)

The volume of foreign investment is a result of availability of production conditions (physical, human and financial), of opening up new export markets and of governmental investment encouraging policy. We can group the investors according to different selection rules; we shall group them according to their motivation and as they gradually appeared in the Hungarian economy.

*Adventure capital.* In the years before and after the changes, the legal system was different compared to market economy and the rules changed as the system was gradually adjusted to the new regulations. In this period there appeared a special group of investors, who took the advantage of the transitional period and wanted to get very high return on investment and planned only for a short period. These investments were not interested in any form of technology transfer or innovation, only in high profits.

*Commercial capital.* In early 1990s one of the fastest developing sector was commerce, which expended rapidly after the shortage economy of the previous regime. Multinational chains[1] reacted rapidly to the new market opportunities and invested in new strategic positions. In the past years more and more supermarkets, hypermarkets and shopping malls were opened in Hungary. In the first years this

[1] The German Metro chain opened its first store in Budapest, later in most of the major cities in Hungary. Szeged (160,000 inhabitants) is located in South-East of Hungary and was one of the first target cities. The reason for this was that the size of its market is larger than expected as cross-border trading plays an important role in the region (Yugoslavian and Romanian commercial tourism).

were very profitable for the first-comers, but in recent years serious competition cut the profit rate. Changing consumption patterns provided favourable conditions for investors, though the size of the markets will limit the expansion. Commercial activities do not require regular and technology-intensive developments; technologies from developed countries were adopted.

*Service capital.* Besides the commercial sector, the service sector was the other major target of foreign investors even in earlier years. The investments were substantial in bank and financial services, business services (marketing, management, quality, etc.) and public utilities. The major motivation of these investments was access to the markets. The innovation demand of these services was rather low as technologies from the mother company were adopted.

*Production capital.* One of the major motivations of foreign investments in production was low labour cost and low raw material cost. These production companies of all sizes appeared gradually in Hungary, peaking between 1995 and 1998. They invested in earlier years in Hungary, but recently a migration of these companies eastwards can be observed, as labour cost in Hungary is not as low as in some other CEE or NIS countries. A great portion of these investments was in the framework of the privatisation process, though in recent years green field investments or additional investments have been dominant. In privatised companies former technologies were mainly used with some upgrading or technologies from the mother company were transferred to CEE. The innovation process remained at the mother company.

*Technology capital.* In recent years a new concept started to attract investors: low engineering cost. The trend shifted from low labour cost to low engineering cost, where the investor took the advantage of high-qualified engineer and technician resources; their cost is lower by a factor of 10 compared to the the same cost in developed countries. The other way was that Hungarian engineering SMEs became subcontractors of foreign companies providing high quality and inexpensive services. The third way was that long-term Hungarian subcontractors received R&D (product and technology development) tasks from a foreign main contractor after a few years, as a result of reliable subcontractor relationship in production. These last two processes have induced personnel development and investments in the Hungarian technology oriented companies.

*Research capital.* At the end of the 1990s a new form of investment appeared in Hungary: research based investments. Some of the multinationals realised that Hungarian research potential can be used in a very cost efficient way for their strategic research and applied research activities. Researchers of international standards provide excellent human base for these investments accompanied by the financing incentives of the government. As a result, General Electric, NOKIA, IBM and Knorr-Bremse installed research centres in Hungary. Most of the major software houses opened programmer centres in Hungary based upon the excellent and inexpensive human resources.

These different investment groups have different implications on the Hungarian economy. As commercial, service and production capital require developed market conditions, a well-established infrastructure, technology and research capital require solid human resource and a high quality educations system.

CEE countries have to position themselves according to which type of capital they can or want to attract to their country. They have to adjust their investment incentives and education system according to these directives (Sadowski 2001).

### 4.4 Problems of the academic circles

One of the major sectors in innovation and source of technology transfer is the academia (higher education institutions and research centres). Their potential in the economy is decisive, as they perform most of the basic and applied research. They provide potentially all the R&D capacities for the SMEs that do not have their own. Unfortunately knowledge centres cannot fulfil this expectation due to several reasons (Chataway 1999, Lengyel 2002b, Török 2001).

(a) *Mentality of the academia versus market expectations*. There is a mismatch between the mentality of this sector and market economy, which results in serious barriers in practical co-operation.
   - *Basic research versus applied research*. Researchers focus mainly on basic research and also professional and carreer expectations push them towards basic research. The business sector would expect applied research or even technology development or simply solutions for industrial problems.
   - *Perfection versus optimum*. Researchers are always looking for the optimal solution while enterprises expect the best cost effective solutions.
   - *Publication versus confidentiality*. The carreer of researchers strongly depends on the number of their publications so they aim to publish as much as they can. Enterprises would prefer confidentiality and/or protected intellectual properties.
   - *Scientific language versus business language*. The two circles use different languages, which is again a serious barrier in communication and co-operation. Even when they use a similar word they may mean something different (e.g. technology).

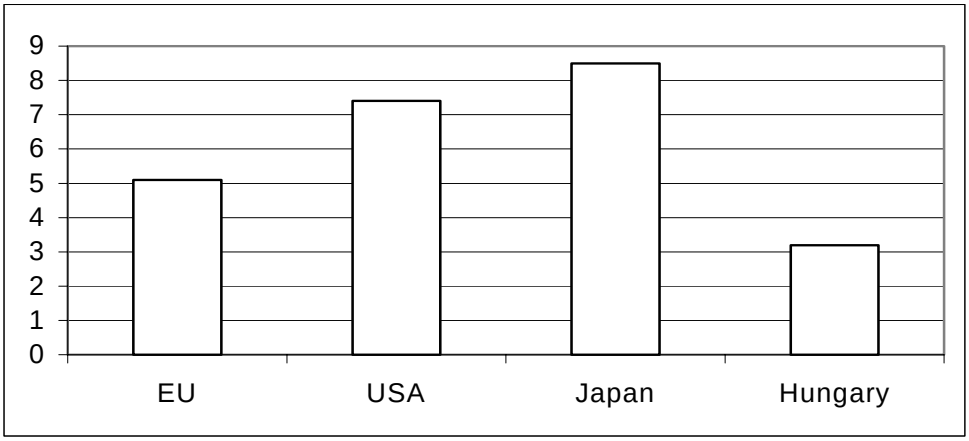
(b) *Financing.* The research sector is underfinanced. In previous times it was completely financed from the central budget, while today it is only partially financed from central sources, therefore it has to get additional funding from national and international grants and from the market. This fact would force it to open to the business sector, which is a very slow process.
   - *Missing IP management, unclear IP ownership*. In many institutions it is unclear who has IP ownership rights (researcher or institute) and who has

the right to sell them or use them. There are no offices that could assist researchers to decide if their research result has a business potential and can be protected or published. Innovation assessment is an unknown concept.

- *Timescale of co-operation*. Hungarian SMEs are mainly interested in short-term projects, which will not require larger or longer financial obligations. Research institutions prefer long-term co-operation, as they have to calculate with an annual budget and plan for longer terms.
- *Informal collaboration*. There is a special phenomenon, when one or few researchers work on the industrial task as private people at a low cost, using university facilities. In this case the researchers can earn direct money and there will be less expenses to the business partner, but the university will not benefit at all and even the overhead cost will be paid by the university.

(c) *Human resources.* The Hungarian research community faces serious generation problems. Due to local and international brain-drain the older age group (50-60) is dominant and there is a new wave of researchers (25-30) as PhD students. At the time of changes many of the researchers and faculty members left university and found a new job in the business sector or directly in industry. A large group of researcher had already worked in developed countries under much better financial and infrastructural conditions. The attraction of the business sector and foreign laboratories is still a serious problem, as mainly the most flexible middle aged people are ready to move, so the future leader persons are lacking from the system. The number of researchers is very low compared to that of developed countries' (Figure 4.3).

*Figure 4.3* Number of researchers per 1000 labour force in 1997




*Source*: HCSO (1998).

(d) *Marketing.* The institutions usually have no marketing concept. They just do not think about "selling" their knowledge. The institutions or the researchers do not even know the potential business partners or the value of their intellectual property. There are no marketing, PR or promotion activities.
(e) *Management.* The management structure is based upon scientific merits. In research institutions a career is based upon publications, titles, international experience and awards. These scientific abilities are usually not accompanied by management skills. These leaders have experience in management, communication, financing, law, etc. The proposed scheme, that the academic and business management of these institutions should be separated is not accepted by the community. An additional problem is that certain business oriented operative units are lacking from the system. (Farkas 2001)

The current problems of the Hungarian (and most probably overall CEE) research sector are very similar to the problems of that of developed countries' in early 1980s. Therefore their solutions or the models can be very useful for solving the problems in CEE countries (Sedaitis 2000, Balázs and Török 1996).

## 4.5 Institutional support system in Hungary

In CEE countries the institutionalised business support system must play a decisive role in innovation and in business development. The Hungarian system has many different elements including governmental bodies, NGOs, chambers, professional bodies, etc. (Papanek et al 1999). The system is still under development, as it is not really ready to provide innovation and TT services, only general business support services (financial, legal, training, …). Activities are not concerted, they mainly work individually therefore in a parallel fashion. The human resources have no professional knowledge in innovation.

The *governmental institutions* have only an indirect role in TT or innovation. The main actors are the Ministry of Economy and the R&D directorate of the Ministry of Education. They are responsible for developing technology and innovation[2] policy, for strategies, allocation of funding, and national participation in international programs.

The two major *professional organisations* are the Hungarian Association of Innovation and the Federation of Technical and Scientific Societies. The main goals

[2] The national development plan – Széchenyi Plan – had various priorities for the national economy, one of them was the R&D and innovation program. One of the main goals of this program was to foster collaboration between research and business sectors. Other priorities (Business development program and the Regional economic development program) also emphasised development of innovative economy.

of the *Hungarian Association of Innovation* (approx. 500 members, businesses, research institutes, NGOs) are to foster creation and the application of intellectual properties and to develop economy through innovation. It operates an information system for the actors of the innovation chain, represents the interest of its members towards governmental organisations and has a thorough national and international contact network.

The *Federation of Technical and Scientific Societies* coordinates the activities of 42 national scientific associations. This affects almost 100,000 engineers, researchers, economists, and agrarians. The individual associations have contact with several thousand businesses. They play an active role in the innovation of the national industry.

Currently there are only very few organisations that can provide *services in innovation* and especially in TT. The first initiatives took place in the early 1990s, and as result, the International Technology Institute (NETI), and a BIC – INNOSTART – were established. These organisations may provide efficient services to businesses in the realisation of their innovation and technology development.

The goals of *NETI* (established in 1991) are to disseminate international high-tech, develop activities in the field of TT and to market Hungarian technologies. *INNOSTART* was established in 1994 for identification of the most promising innovative projects, supporting these projects in their realisation and providing innovation services and infrastructure for them.

## 4.6 Human resources and knowledge transfer

The major barrier in CEE countries is the lack of well-trained human resources. The *education system* is not prepared for these types of courses and cannot cover the newly emerging demands. According to a recent survey in Hungary, multinationals provide 6 months training to new employees to meet their expectation, which also applies to those with higher education degrees. This means that the education system must be modernised in these countries (in some countries this is already in progress).

*Higher education* does not provide courses, which will produce graduated people with the ability to work in the field of innovation or TT. The current system can produce engineers, scientists, economists, informaticians, lawyers but interdisciplinary courses are very rare, although innovation and TT require a mixture of all these disciplines. The innovation managers should be able to communicate with research and business circles, as well. It would be essential to develop new curricula[3], which will break up the traditional structures. The higher education sector

[3] Hungarian technical HEIs launched a new course, "technical manager", which was a success as its graduates were very popular among the industries. But as industry will absorb

must understand that socio-economic demand has radically changed and that the employers do not look for graduates with traditional knowledge but with directly applicable knowledge. Unfortunately the reaction time of higher education is slow compared to that of business life and legal regulations'. The preparation of a new course (curriculum development, accreditation, launching) would take 2 years and it would take 3-5 years to have the first graduate and the labour market.

An additional problem is that even in the new courses we do not have lecturers, who have the expertise to provide relevant knowledge. The lecturers we have are specialists in old disciplines, so currently the courses comprise different "old" disciplines (engineering, sciences, economy, informatics) in a good mixture. Specialisation covers immediate industrial needs, such as quality and logistics. It will take years to refine these courses towards innovation and TT.

The developed countries can play an important role in knowledge transfer. Numerous international or transnational (e.g. PHARE, NATO Science for Peace, EU FP5) programs can provide opportunities and funding for different knowledge transfer means. Study tours, internships from CEE to developed countries or technical assistance (experts visiting and assisting local partners and giving lectures at local HEIs) from developed countries can provide efficient ways to improve the knowledge base in CEE. The target groups of these actions are the NGOs, HEIs, private consultants and business support organisations (Balthasar et al 2000, Rappai et al 2003).

The above chapters drew up the picture of a transitional innovation system in a transitional economy. It is obvious that there are broad business opportunities for private consultants in the field of innovation and TT services. The market has three major target groups: (a) the (local) governmental sector; (b) universities and research centres; (c) businesses.

(a) *Local governments and the government*. These include national, regional, county and local governmental bodies, decision makers and their operative bodies (regional development agencies, local enterprise agencies, etc.). This market segment mainly requests consulting services, the elaboration of innovation models or strategies, operative programs, feasibility studies of organisations, and definition and implementation of projects.

(b) *Universities and research centres*. They have two major demands:
   - *Organisation development*. There is a recognised need for development and establishment of organisations to handle and manage IPs and research results. The form of these organisations can be either an ILO (providing services in writing project proposals, TT, industrial co-operation, licensing, etc.) or an incubator, which can handle longer-term business interests. The

all these graduates, it will take years to see these experts in the non-profit sector (business support organisations, ILOs/TLOs, etc.).

role of the consultant is to plan these organisations (feasibility study, business plan), or even pilot operation.

- *Technology transfer service*. As these institutions are major sources of research results and IPs there is a tremendous need for commercialisation of these results (Bray and Lee 2000). In most places there is no ILO/TLO, so these tasks are out-sourced to private consultants. The private consultants cannot afford to work on all these topics, as the probability of a business being profitable is very low.
- *Businesses, especially SMEs*. This market has the greatest potential. This sector has a partially recognised but mainly latent demand for innovation and technology The most frequent problem is the identification of financing resources, which practically means writing project proposals for technology development (which also may mean simply purchase of technology). Another expanding need is technology request (TT). Businesses also have different other needs, such as co-operation partner search, information, training, etc.

Private consultants play an intermediary role among the governmental, academic and business sectors, as well as between different regions even on an international scale. They bridge different interests, information, products and services to the relevant actors, they follow the market needs and react to different needs with a flexible service spectrum. They also have an important role in networking, information dissemination, and communication with international partners. These businesses are for-profit organisations, therefore they cannot take on many tasks that are important but not profitable, and which therefore should be performed by NGOs or other non-profit organisations. Some of the profit making activities are also provided by non-profit organisations, which may lead to conflicts, but this phenomenon has been discussed in the developed countries already for decades.

## 4.7 Conclusions

The different actors of innovation and technology transfer are facing barriers in Hungary. The innovation awareness of local businesses is low, we can say that technology needs are in some cases unrecognised, and the financing schemes aiming to support the spreading of innovation are underdeveloped (most of the companies are under-capitalised). The low level of national R&D expenditure and share of business sector is an other problem.

As a result of the political and economic changes, interest of foreign investors rose in various sectors in Hungary. These investors can be grouped according to their innovation behaviour, and thisway we may speak of “adventure capital” (in the pre-change era, no need of TT), “commercial capital” (early times after the changes,

no need of TT), "production capital" (based on low labour costs, TT and innovation on home grounds), "technology capital" (based on low engineering costs, TT and innovation is partially in CEE), "research capital" (based on low research and engineering costs, establishment of local research institutes).

As we have pointed out earlier, the major problem on the academic side is the attitude, the low level of business awareness of researchers. While financing is still expected from the state, the intellectual property right situation is unclear in most cases. Researchers and the institutes are not able to communicate with business circles.

The institutionalised business and SME support system is under development in the CEE countries. These NGOs are not prepared for innovation and technology transfer services, only for general business support. There are only a few organisations, which are specialised for innovation and technology transfer.

One of the major barriers of missing services is the lack of trained innovation and technology transfer experts. Knowledge transfer from developed countries through international programmes could partially provide a solution. Training of CEE experts can be done efficiently by internships in well-functioning organisations.

The missing institutional support system gives the opportunity to the private companies to provide services on commercial bases to companies and research units. These services may cover technology transfer, innovation consultancy, writing project proposals and grant application, project management. The private consultants have the necessary knowledge and relationships to provide these services, and to help the technology transfer process, but the governmental support is very inportant in the spreading of innovations.

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