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KERESZTES Gábor[1]

The Hungarian Innovational Potential and the R&D Sector[2]

Usually, when one says „innovation", novelty and the ability to renew come to mind. The measurement of the concept has become a very important field of study and a key indicator of national economies. In this article, after a short review of the theoretical approaches to innovation, I am going to examine the status of the Hungarian R&D sector. Where is Hungary now in terms of innovational activities? Who are the actors and the funders of the system, and more importantly: in what proportion? What fields are prominent in domestic practice? Amongst others, I set out to find the answers to these questions in this article.

Keywords: innovation, R&D, innovational performance, financing
JEL Codes: I23, O31, Q55

A magyar innovációs potenciál és a K+F szektor

Az innovációról mindenkinek az újdonság, a megújulás képessége jut az eszébe. A fogalom mérése nagyon fontos területté vált és a nemzetgazdaságok kulcsmutatói közé emelkedett. A tanulmányban az innovációról alkotott elméleti változások rövid ismertetése után a magyar K+F szektor helyzetét vizsgáljuk meg. Hol áll Magyarország az innovációs tevékenységek tekintetében? Kik a rendszer szereplői és finanszírozói, ráadásul milyen arányban? Milyen területek emelkednek ki a hazai gyakorlatban? A cikkben többek között erre keresem a válaszokat.

Kulcsszavak: innováció, K+F, innovációs teljesítmény, finanszírozás
JEL kódok: I23, O31, Q55

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Introduction

Since the dawn of history, continuous innovation and technical-intellectual inventions have been the drivers of development. The great ancient inventors changed the way of thinking of their time fundamentally, and with it, they've become ineffaceable in the history of science. The development of the world – despite some shorter or longer interruptions – can be regarded as continuous, and the industrial revolution stands out within this timeline. The scientific life of Hungary bloomed in those "happy days of peace" too – with numerous inventions and scientists, the Hungarian innovation potential was rather strong.

This study focuses on the examination of the R&D-based innovational performance, conforming to international trends. Through decades, the notions research, development and innovation (R&D&I) have become inseparable in domestic understanding. However, I must not forget to mention that there are innovations without R&D, e.g. in the case of accidental recognitions. Szabó (*2009*) for instance, calls them bare-footed innovations without research, which, in some economies, are even more prevalent than consciously developed innovations.

About innovation

Although the concept of innovation was first discussed only at the beginning of the 20th century, it is clear that this area had enjoyed overriding importance for mankind long before. Joseph Alois Schumpeter was the first to lay down the foundations of innovation. In his work, he ponders as follows: "Production is the combination of existing things and forces…To produce something or to produce the same thing in a different manner however, means combining these things and forces in some other way." (*Schumpeter, 1911*) With Schumpeter, the keyword is combination, as it is the source of the opportunities of innovation. According to him, only innovation can bring the cyclically changing economic systems out of recession and generate dynamic development. Later, in his work, he distinguished five basic cases of innovation, which are the following (*Schumpeter, 1939*):

- The production of new goods not yet known in the consumer circle or the production of existing goods on a new qualitative level.
- The introduction of a new production procedure or method formerly unknown in the practice of the specific industry which is not necessarily the result of a scientific experiment – indeed it can be a new commercial procedure connected to a commodity.
- Finding new outlets for the product, i.e. opening a new market previously unknown in the country or industry.
- Exploring new procurement sources on the market of raw materials and semi-finished products.
- Establishment or wind-up of an organisation.

With Schumpeter, the basis of the innovation chain is a new contrivance, a new idea, i.e. an invention. Innovation (R&D) is defined by him as the practical realisation of this invention. He called the last phase diffusion, which meant the dispersion of innovation (*Kiss, 2005*). Examining the theory from the human aspect, the Nobel laureate economist thought that the inventor himself was the basis of everything, and the venturesome innovator – who is obviously driven by profit – makes use of his invention and his knowledge. At the same time, in several cases, the levels and the characters of the innovation chain may blur. Certainly, several authors have written about the critics of Schumpeter's theory of innovation, but I do not want to go into details about them in this study.

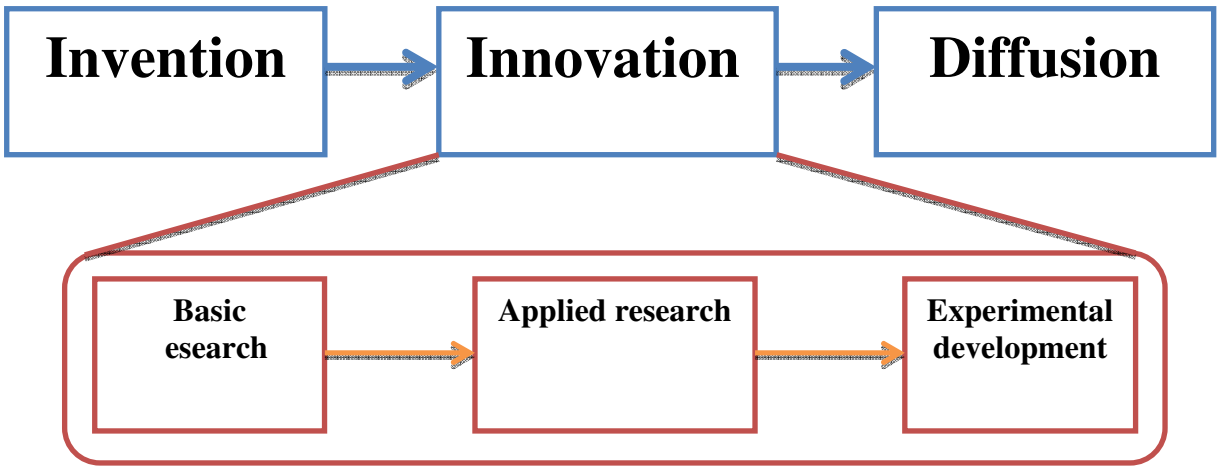

Figure 1.: The process of innovation
Source: Kiss (*2005*)

R&D has three main parts (*Figure 1.*) that are defined by the Hungarian innovation law as follows:

1. **Basic research:** "*an experimental or theoretical work carried out primarily to acquire new ideas about the background of phenomena or observable facts, without the aim to determine their practical application or use.*" Its results can be mainly found in studies and publications.
2. **Applied research***: "a planned research or a critical investigation that aims to obtain new knowledge and skills for the development of new products, processes or services or for the improvement of existing products, processes or services. It also includes – particularly for the control of generic technologies – the creation of the components of complex systems necessary for applied research, with the exception of prototypes."* Practically speaking, it aims to explore the possibilities of the practical implementation of the basic research.
3. **Experimental development***: „Acquisition, aggregation, sharing and use of existing scientific, technological, business and other relevant knowledge and skills to create or devise the plans and the rules for new, altered or improved products, processes or services."* (*Act CXXXIV of 2004, about Research and Development and Technological Innovation*)

Back to the development of the innovation theories: with time, the notion of innovation has become clearer and has undergone changes. According to some scientist, the concept of innovation has two fundamental meanings: the objective approach and the procedural approach (*Perlaki, 1981*). From the perspective of the objective approach, innovation means always some kind of novelty, which has a positive and advancing character, or a change that is aimed at something new. Hereby, Perlaki thinks of thoughts, objects or activities which are acceptable and applicable for a specific group or organization.

Later, Freeman (*1982*) examined the innovations from a new prespective and distinguished more basic types: the gradual-modifying innovations, the radical forms, the procedure changes and the paradigm shifts of industry (technical revolutions). To the first group, he assigned cases, when a company is able to enhance its performance with the available technology, or reduce its costs with existing technology by a series of continuous little steps, which means the replacement of components. Radical innovations always mean some kind of total innovation, new technologies or new products.

At the beginning of the 3rd millennium, the definition of innovation of the OECD expanded and nowadays, examinations concentrate on four main areas: besides the *product* and the *technological* (procedural) approaches, one distinguishes also the examination of the *organizational* and *marketing* innovation procedures. Here, I must mention the product lifecycle

theory, according to which innovation can not only create new products, but it can also push them out from their lifecycle stage, especially the stages of maturity and decline (*Pakucs-Papanek, 2006*).

The currently used and universally most widespread definition of innovation is a recommendation of the OECD (Oslo Manual) and sounds as follows: "*Innovation is the introduction of a new or significantly improved product, procedure, a new marketing method or organizational method into the business practice, at the workplace or in exterior relationships. Innovation is the transformation of an idea either into a new or a modernised product on the market or into a new or improved method used in the industry or trade, or it is a new approach to a social service*." (*OECD, 1997*)

The following chapter examines the status of the Hungarian R&D sector and the innovational potential.

Comparing domestic and international innovation processes

The figure below shows the innovational performance of the 27 member states of the European Union and distinguishes four categories: a narrow group of countries driving innovation, a wider group of innovation followers, the moderate innovators and finally, the group that missed innovations.

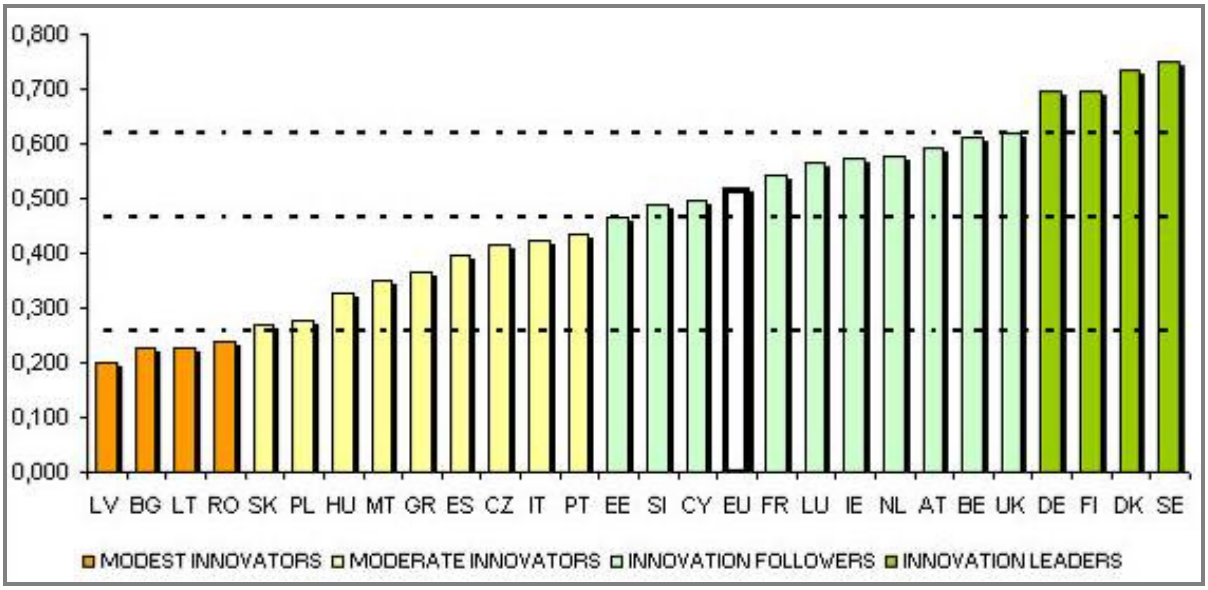

Figure 2.: EU Member States' innovation performance
Source: IUS (*2010*)

When I examine the innovational performance of the EU member states, I see that Hungary belongs to the lower third of the list, to the group of countries with moderate innovational activity, which are mostly Eastern European countries. Given the fact that in 2010, only 1,18 % of our GDP were spent for funding R&D activities (*KSH, 2011*) this comes as no surprise.

In this respect, one can notice a clear decrease, mainly as a result of restrictions in state orders, the changes in law conditions and the difficult market and economic situation. By all means, increase is needed in order for Hungary to reach the level stipulated in the EU Strategy 2020 to spend at least 1,8% of the GDP on innovational activities. Incidentally, even in that case, Hungary would be quite far from the EU's 3 % goal that had been established in the Lisbon strategy.

The following Figure Nr. 3 shows the innovational activities of Hungary and of the EU with respect to the rate of GDP spent on the support of R&D. It is clear from the IUC (Innovation Union Competitiveness report) data, that the EU's innovational intensity has practically stagnated since 2000, and according to trend calculations, a considerable rise is unlikely to happen. In contrast, Hungary exhibits a somewhat bigger fluctuation, although, in my opinion, the assumed growth in the 2010 statistics is far too optimistic considering both the trend and the aim. Viz. since then it has become quite clear that the crisis and its effects are not yet over. Moreover, the government has ordered the withdrawal of further funding from the affected sector; just take the financial cutbacks and blockings in higher education that is one of the prominent actors of the domestic R&D sector.

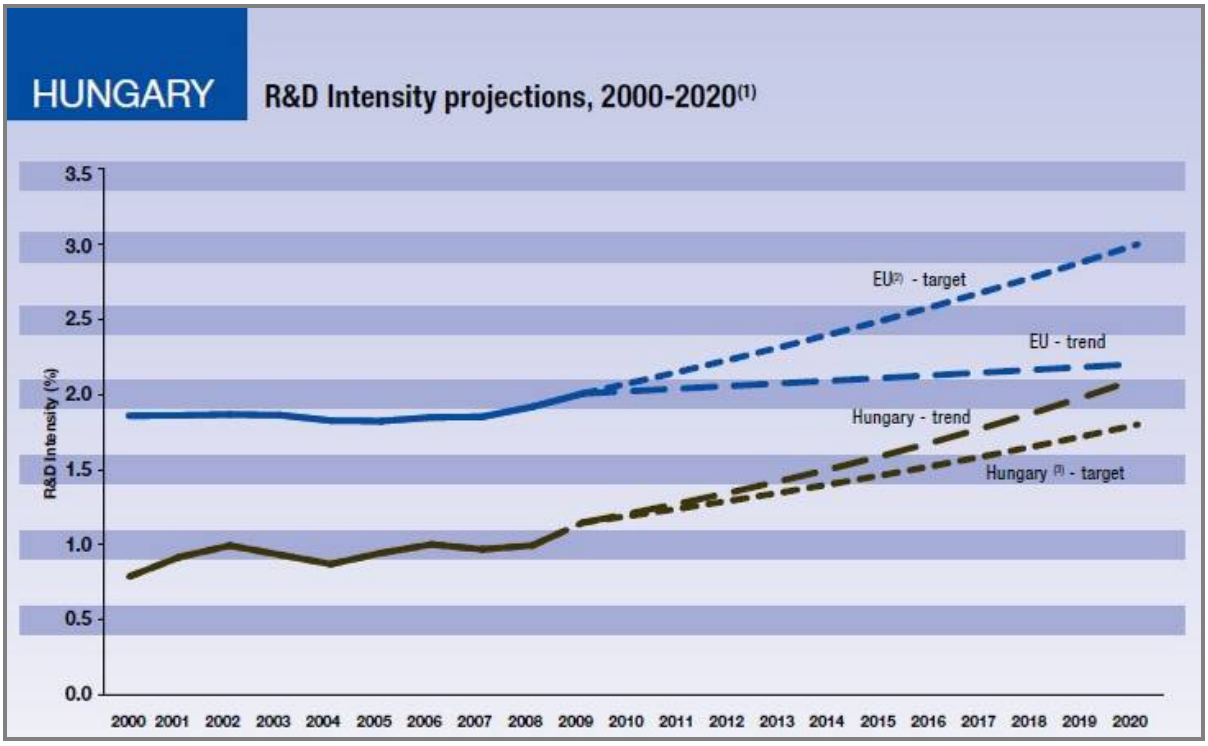

Figure 3.: R&D Intensity projections in Hungary, 2000–2020
Source: IUC (*2011*)

It is also interesting to observe the main subjects of the domestic R&D sector: besides the state-funded research institutes, research and development establishments of the private sector have become increasingly important. This is a positive trend, because in the Western countries, the market's share in the sector is considerable. So much in fact, that within 5 years, the expenditure of the private sector has doubled whereas that of the other two subjects has remained stagnant. Besides them, higher education appears as a further main subject of innovation.

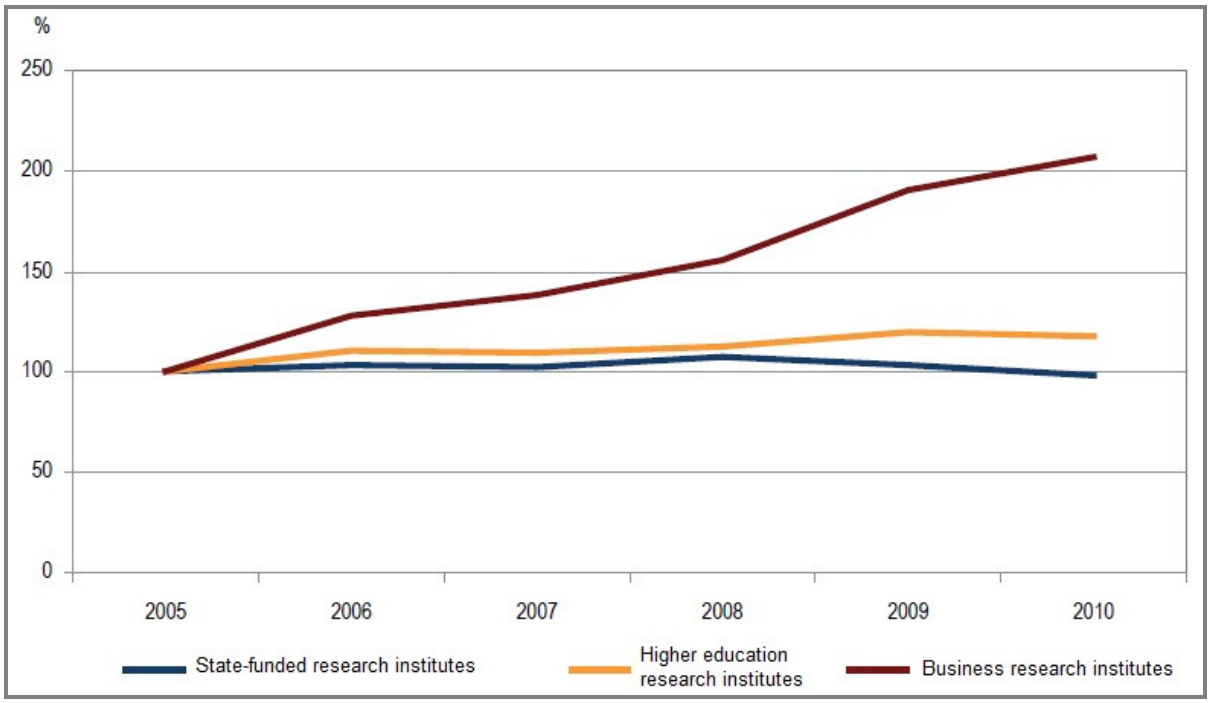

Figure 4.: The change of expenditures on R&D by sector, based on the 2005 %, in Hungary

Source: KSH (*2011*)

In 2010, Hungary spent about HUF 310 billion on innovational activities, which – compared with previous years – can be described as a slight growth (*KSH, 2011*).

According to the next examination aspect, funders of the sector can be the state, the domestic undertakings and the foreign investors. The *Figure 5.* shows is that the state budget remains to be a significant funders of the sector, while the domestic undertakings spend hardly more, despite the remarkable rise in their innovational activities discussed before. I have to mention too, that although in a small scale, foreign subjects also take part in the financing of the domestic R&D activities. Presumably, they support these activities owing to special local demands.

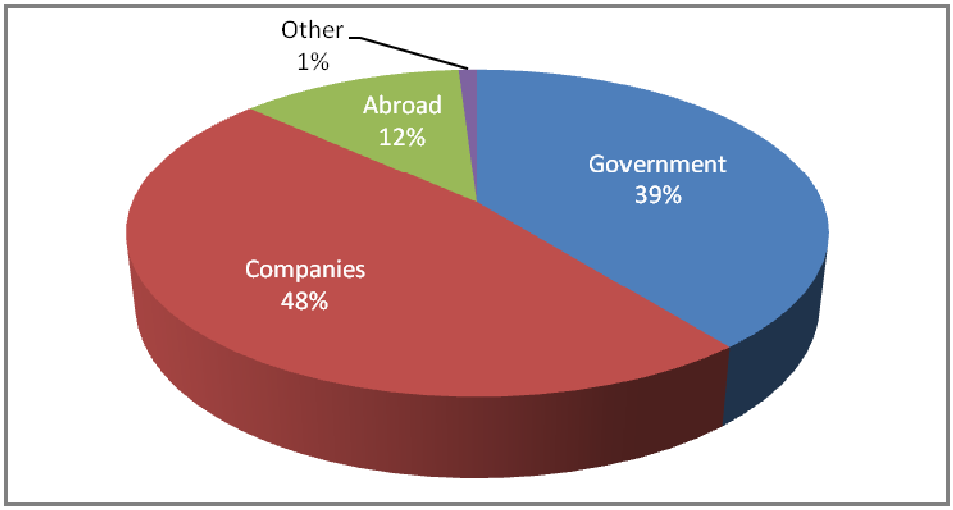

Figure 5.: Funders of R&D

Source: KSH (*2011*), self-made figure

I can also find interesting results when I examine the types of innovational activitites pursued by the domestic undertakings. As we can see it in *Figure 6.*, the situation has changed considerably, since some decades ago, the sector was mainly characterized by the organizational innovations. Today, their proportion among the domestic companies has declined as technological innovations are taking their place. The proportion of product innovation can be considered as fairly constant. The reasons include the opening of the market after the political sytem change and the new economic system that attracted foreign capital. These investors brought with them an advanced technological background that they improved further. At the same time, one might observe some blurring between the definitions, as there is no sharp border between the solutions concerned.

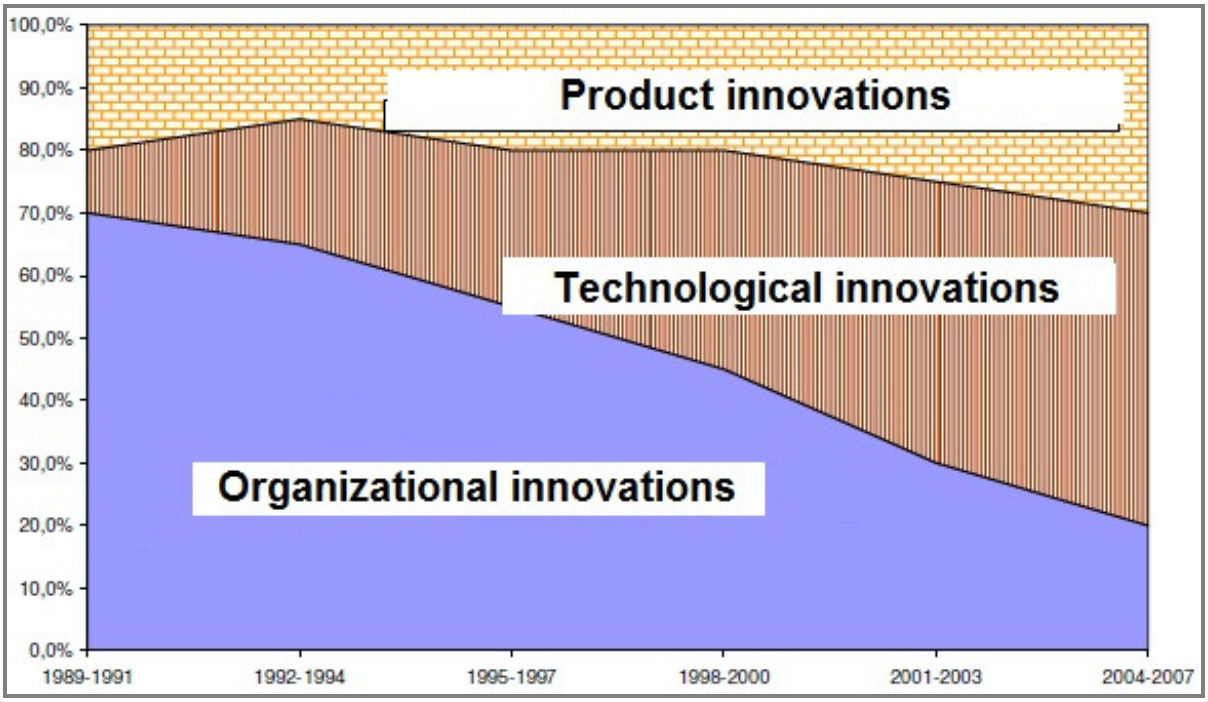

Figure 6.: Features of the innovational performance of domestic undertakings according to main innovation types
Source: Pitti (*2008*)

Reverting back to my previous explications it is interesting to observe the following diagram: it shows how the parts of the innovational process according to Schumpeter are distributed in Hungary. The applied research and the experimental development appear to have similarly large proportions, while the basic research has the smallest proportion. I may consider this as acceptable, because not all subjects deal with basic research with the same intensity. However, private and public sector factors make equally use of each other's basic researches. The really important parts are the applied research and the experimental development. These play significant role in the relationship of the research institutes and the private sector, since companies tend to look for answers to specific problems. This way, research institutes can adapt themselves to real needs and develop their curriculum accordingly.

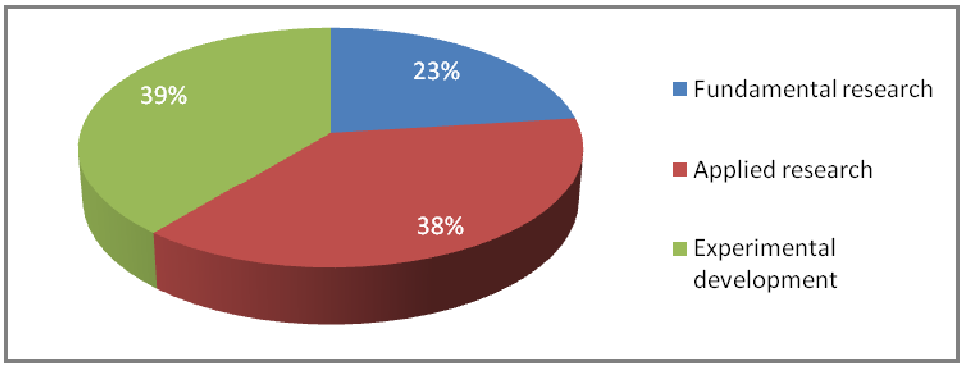

Figure 7.: Domestic R&D expenditure according to activity types
Source: ECOSTAT (*2009*)

The next figure shows the regional distribution of the domestic research institutes. Central Hungary stands out clearly, mainly because of Budapest. The remaining regions do not show striking divergences. The regions with larger universities rise slightly above the average, but they are divided roughly equally. It is much more interesting that higher education research institutes have the greatest proportion. Their R&D activity is financed from the state budget as well as from private sources. If the private sector continues to develop in terms of contribution to innovation, higher education institutions can expect a drop in the number of private orders. The changes in the legislation regarding the innovational discounts may pose a further problem to these institutions, since they might lose additional financial resources.

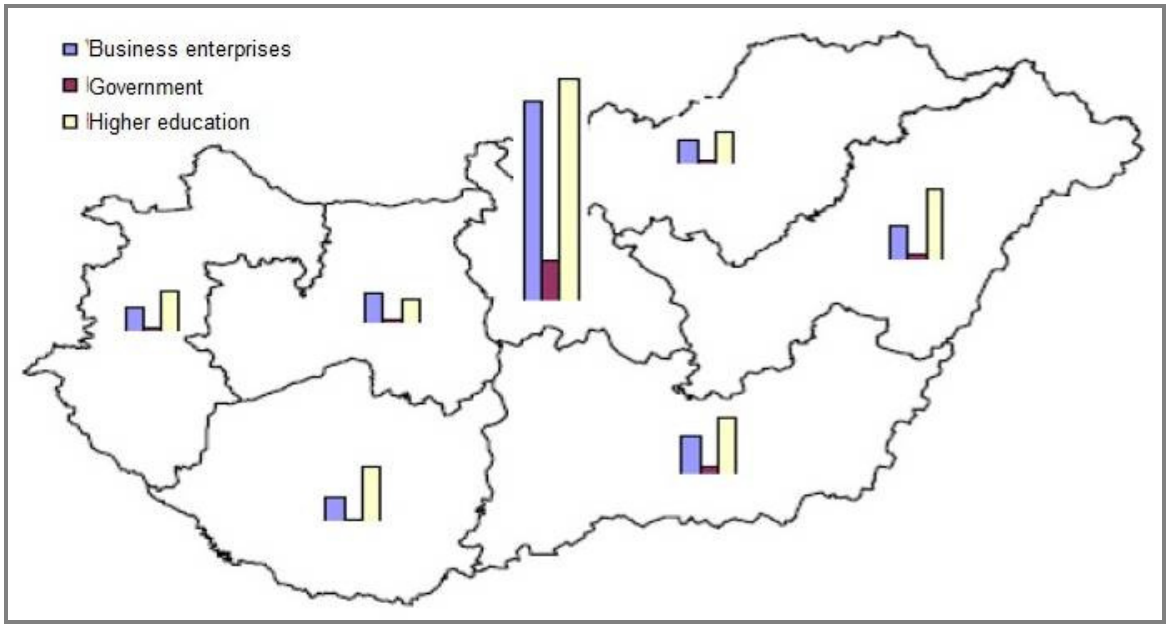

Figure 8.: Regional distribution of Hungary's research institutes in 2007
Source: ECOSTAT (*2009*)

Summary

Having examined the situation of the Hungarian R&D sector it is clear that Hungary is lagging behind in comparison with the EU average. What's more, the country is among the file-closers as regard to the rate of GDP spent on innovational activity. The increased participation of the private sector should be appreciated even though there is still much to catch up on in this respect. Should the new rules on innovation have negative effects on the undertakings a further fallback can be anticipated.

As far as the plans and the current economic situation are concerned, it is not sure that Hungary wills come closer to the EU average. Nevertheless, in case of a protracted recession, even the European Union will have difficulties in achieving its goals defined in the Lisbon strategy. In terms of innovational potential, the Hungarian companies are behind those of Western Europe. If Hungary wants to be competitive, companies will need to get down to some serious thinking, for it is continuous renewal which brings the world forward. It is to be feared that foreign country investments will not increase in the sector while the domestic companies will not be able to make additional investments because of their efforts to overcome the crisis. In terms of regional distribution – similarly to other sectors – the role of Budapest and its surroundings is far too dominant, while it is clear that R&D in rural areas needs development.

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