

Role of Research and Development in the 21st Century

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For the countries the importance of Research and Development has increased lately. In order to strengthened the economy of that given country more input are needed towards to these direction. Those countries that support researches could achieve higher GDP, which is an important issue. So these questions stepped into spotlight to try to close up the gap between the different levels of development.

In the fist part of the paper the current EU Regulation was in spotlight. An observation was made to point out the lower R&D role than desired by the EU itself. With calculations of the different origin of sources and their relationship with the GDP per person we would like to point out the importance of the research and investment level in the future growing.

Keywords: R&D, Efficiency, GDP, Business sources.

Introduction

It is evident that for achieving long term economics growth the amount of Research and Development (R&D) is highly important. The direct effect can be measured with difficulty because of the lag and the real correlation. So following the real effects of the successful product innovations, developments will be more and more important but also difficult because of the rapid technological improvements and the increasing number of new clients and markets. Consequently besides knowledge needed sectors like IT, the desire of improving R&D in the „original” productivity sectors, such as agriculture is also strengthened. Production improving becomes global strategic question for the enterprises and creates new challenges, both operative and strategic. New tasks appeared for fulfilling the problems, such as new positions line R&D controlling and innovation management level. But even of them, still many of the improvement tries happened without the observation of its usability or the lack of sources. Many projects do not fit for the market requirements.

Material and methods

In the period of 2007-2013 more than 50 billion euros can be useable for R&D objectives. The main goal of the state-support R&D is to improve sustainable growth throw the increasing economic efficiency and number of employees. Because of these goals the state-support can be comparable with the

common market and do not harm or affect the competitiveness of it. Moreover, further researches, development and innovations will be expected.

Improvement of R&D is a common aim. According to the EU Commission Regulation, “Strengthen of scientific and technical basic of common industry, urging improvement of the international competitiveness meanwhile support [...] the sufficient research tasks.” The Regulation declares the parameters and also the application fields of the funds and the whole system. By the paragraph of 87 of the EC Regulation, comparable with the common market: “those supports which improve the economic situation in regions where the level of living and the employment rate is quite low. These kind of supports, which effect the economic, do not harm the situation of the common market in different direction.”

So this funds can aid to concentrate those fields and markets need to be improved but with strong control not to result contra productivity. Because of with damaged market structure the economic growth can be drifted. The negative effect can be:

- Pushing enterprises out of the market;
- Support non-effective production;
- Destroy the balance of market ;
- Harm the existing economic share between member states;
- Influence the inner market (demand, supply, prize, quality, ect.).

The supportable revenues can be:

Cost of Labour; Cost of assets (like special instruments, buildings, land) during the research projects; Cost of Leasing, knowledge; Further basic and working costs connected directly to the research projects.

Discussion

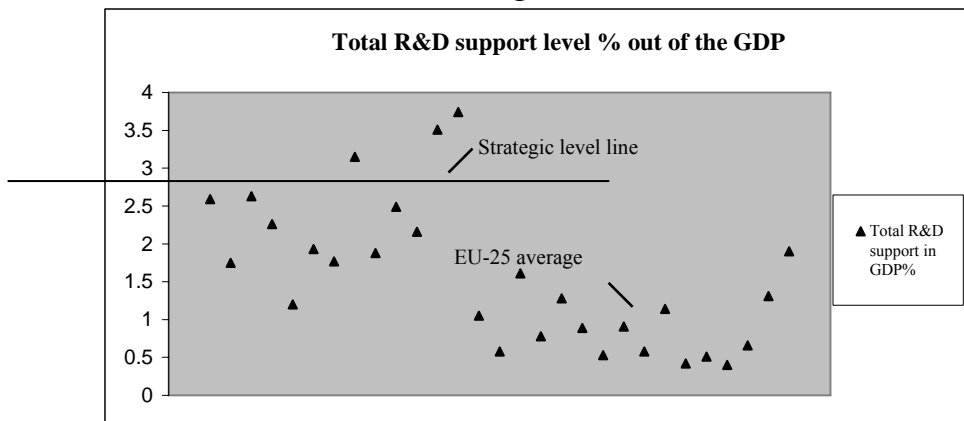
Compared with the previous etap from the middle of 1990's the productivity of Europe is lesser than in the USA. So in 2000 the **Strategic of Lisbon** declared to create the knowledge based effective economy. In Barcelona 2002, **the level of R&D was stated in 3% of the GDP by the time of 2010**. Moreover, **the two third of the source of these new investment must be come from the private sector**. Achieving these levels the research investments must be increased 8% per year in average which means that this num-

ber needs to be between the 6% increasing of state revenues and 9% of private investors.

In 2003 outside Europe the R&D revenues were significantly higher, in Europe it was below 2% (1,93), while in USA 2,59% and in Japan 3,15%. According to the period of 2000-2004, the increasing percentage of research revenues in Europe was just 2,2%, while in China it was around 10% per year. So consequently the importance of the re-declaration of this purpose in 2006 was initial.

In our **first observation**, the EU countries were in spotlight. An analysis was made for the **current situation** whether they can **fulfil the Strategic of Lisbon**. Figure 1 shows the results: the current R&D revenue percentage from the GDP.

Figure 1



Source: Own calculation based on Kemény, Tamás – Vincze, Imre: *Hungarian R&D revenues in the spotlight of international trends. Hungarian Science, 2006*

In Figure 1 the strategic level line (3%), declared by EU can be seen. **Only** three countries out of the observed 29 overpass this percentage. Besides Japan, **Finland and Sweden can fulfil the desired level of the R&D role from the GDP**. The vast majority of the European countries at the moment are very far from it. The Eastern-European countries (on the right) only distributed around or below 1% of the GDP towards R&D while the Western-European countries (on the left) are much closer. So until 2010 many tasks need to be done for the EU members.

Generally, the source of the R&D investments comes from three different ways: from

the states, from the international applications and from the private (business) sector. But in the international analysis mainly divides two sources: the business and the non-business sector. This means with clearance that the business part mainly distributed to improve and research sellable products while the non-business sector support and maintain the research network system.

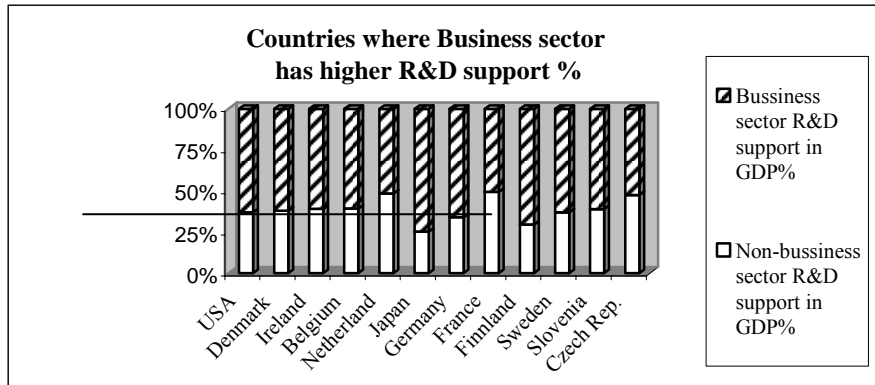
In the next step the divide of these sources was observed. The following two Figures show European countries plus some other developed ones with the two different R&D support source current level.

As it was mentioned earlier, EU declared Strategy was that two third of the R&D sup-

port must come from the business sector. Those countries, where the mayor part of the support comes from this “right” direction can be seen in Figure 2. At the moment only two EU countries can achieve this level (33%),

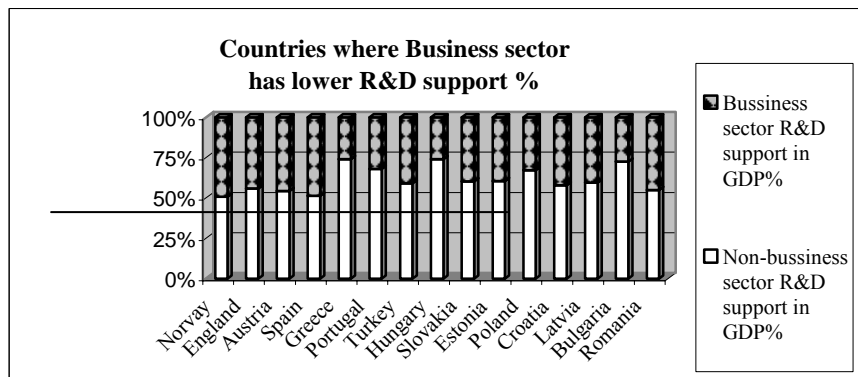
Germany and Finland while other five the percentage is nearly there (below 40%) in Denmark, Ireland, Sweden, Belgium and Slovenia.

Figure 2



Source: Own calculation based on Kemény, Tamás – Vincze, Imre: Hungarian R&D revenues in the spotlight of international trends. Hungarian Science, 2006

Figure 3



Source: Own calculation based on Kemény, Tamás – Vincze, Imre: Hungarian R&D revenues in the spotlight of international trends. Hungarian Science, 2006.

But in those countries seeing on Figure 3 the R&D support based on from non-business sector sources. Add to the fact that in case of the Easterns countries in some of them the figures become worse in the previous years. For example in Hungary the amount of the R&D not increased but decreased slightly. The reasons for the inconvenient figures in the Eastern-European countries could be founded in the lack of scientific background (not existed or destroyed in the transition process), but mainly the strong adsorbing effects from the developed countries where the research possibilities – such as the assets and sources – are there. Also the high percentage of the foreign origin of the sources can affect the lack of interest from the domestic inves-

tors and the state. These enterprises bring their techniques from the maternal company so no need for investing here. Of course these negative and inconvenient trends must be corrected because of the effects of it. In a longer period it could conclude widened lag and further drifted from the EU average. The line of the knowledge-based economic where the R&D revenues from the private sector participate 0,6% of the GDP. So if the percentage of the representation of the non-business sector drops below 0,5% it also could effect the lack of interest from the private sector.

Results

In connection with the previous figures in the last step we **observed the relationship be-**

tween the GDP and the different origin of the R&D sources. For 39 countries all over the world the correlation coefficients were calculated between the following factors: Amount of GDP per person (based on PPS – Purchasing Power Standard), Amount of Non-business sector R&D uses per person, Percentage of Non-business sector R&D support out of GDP, Percentage of Business sector R&D support out of GDP, Percentage of Total R&D support out of GDP%.

The results give information about the following answers:

(1) Whether the total GDP uses for R&D was affected by its inner source structure.

(2) Whether the development level affect the source of the R&D.

(1) According to the Pearson correlation coefficients, the inner structure of the GDP uses is strongly correlated with both the percentage of the Business and Non-business sources. The coefficients are: $R^2 = 0,9790$ and $R^2 = 0,8829$, (with two tailed significance below 0,05). It means that higher the GDP percentage, the higher both sources. But it is also can be seen that Business origin has even stronger correlation, which means that that source can be affected more. Capital attracts more capital.

(2) According to the Pearson correlation coefficients, the development level only affect the source of R&D in medium level. The correlation coefficients between the GDP share per person and different origin of R&D sources are around 0,6-0,7. It point out another significant fact: the development level of that given country is not the key factor need to be observed to know the R&D shares out of the GDP. In those countries, which are in the developing path, and want to close up the gap between the others, like China, discover the importance of the role of R&D. Although the GDP per person is still much lower than in the Eastern-European countries, the R&D share is much higher. That's why the correlation coefficients did not show direct and strong relationship.

Summary

For a country the importance of Research and Innovation is evident. These elements are an

important part of the engine of the economic growth, which is getting slower in the last couple of years in Europe, thanks to the general conjuncture decline. Besides many other problems the lower percentage of R&D was among them. According to the declared EU Strategy, 3% out of the GDP must be used for research, development and investment. But it did not and still does not happen. Outside Europe these same figures are much higher which could result economic advantage for them. The results of the R&D investments can be seen a couple of years later. Moreover, the source structure is also inadequate because of the high representation of the less effective state and non-private sources within it. If the European countries – also the Eastern European countries – do not start something and the circumstances of the R&D do not be improved, in the next decade the Old Continent will have to face further and additional problems originate from the lack of R&D&I level.

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