Business R&D in Europe: Trends in Expenditures, Researcher Numbers and Related Policies
(Executive Summary)

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Executive Summary

**Why look at trends in business R&D?**

The European R&D investment target adopted in Barcelona back in 2002 called for an R&D intensity of 3% (R&D expenditures per GDP) until 2010 with 2% coming from the business sector. Since then, policy measures and initiatives to foster business R&D investments have been flourishing and have received very high political attention, including the Lisbon strategy's Integrated Guidelines for Growth and Jobs. In order to design and implement appropriate measures, R&D policy makers have to understand the nature, the rationale and the relevant trends of R&D investment decisions made by the business sector. Over the last few years, the European Commission launched a number of initiatives aimed at monitoring and understanding business sector R&D with the EU Industrial R&D Investment Scoreboard being the most prominent publication in this respect\(^1\).

**What questions are addressed in the report?**

In order to identify trends in business R&D, this report makes use of available, notably those regarding business expenditures on R&D (BERD) and a number of researchers in the business sectors. Moreover, it presents the diverse European business R&D landscape by breaking down BERD and a number of researchers by economic activity (NACE sectors) and by EU Member State. To complete the picture, the report looks at the policy mix of EU Member States in support of business sector R&D and develops a methodology for the identification of policy priorities in this regard. Within the issue of business R&D the following questions are addressed:

- What have the dynamics and trends in business R&D expenditures been over the last few years? What are the trends in numbers of business researchers and what is the balance between manufacturing and services?
- What policy instruments are currently applied to foster private R&D? Can national priorities be identified?
- What direct financial support from government is given to business R&D? Which sectors benefiting most?

This analytical framework that is complementary to existing exercises for monitoring and analysing R&D, is embedded into the ERAWATCH\(^2\) intelligence service and provides relevant and original policy information on business R&D.

**What trends can be observed at EU level?**

The aggregate EU situation was rather static over the last decade, but…………..

During the last decade (1995-2004) business R&D activities in the EU grew in step with the overall performance of the economy. This was true for both expenditures and researcher numbers. Consequently, its intensity expressed in terms of expenditures as a percentage of GDP exhibited slow growth up until 2001 and has since stagnated. Although on the aggregate EU level the situation is fairly static, trends are much more dynamic for both, Member States and sectors. The main R&D growth driver over the last decade has been the

\(^1\) [http://iri.jrc.es/research/scoreboard.htm](http://iri.jrc.es/research/scoreboard.htm)

The service sector, in particular computer-based services, even during the recent economic downturn – the service sector was also responsible for most of the growth in the number of European researchers. However, manufacturing still accounts for about 80% of total BERD and researcher numbers, making it the core of EU private sector research. Manufacturing R&D was also fairly stable during the recent economic downturn, highlighting the degree of industry's commitment to R&D. However, increasing globalisation and the fact that most manufacturing is performed by large companies (as compared with the service sector) increases the risk of R&D being outsourced to emerging markets outside the EU. Over the last ten years the percentage of business researchers in the total workforce increased by 25%, which clearly demonstrates the trend towards a more knowledge-based economy. However, in the service sector, the ratio of BERD to Gross Value Added (GVA) has remained surprisingly stable over the last decade.

..... especially the service sector showed a highly dynamic growth rate.

**What were the trends in the most relevant sectors of the economy?**

**Only three out of fifteen sectors showed a significant business R&D growth in the last decade, however……**

Out of the fifteen sectors selected for a deeper analysis (representing more than 80% of EU-wide BERD), only three sectors showed significant increases in both numbers of researchers and expenditures over the last decade, irrespective of the general economic conditions, namely 'motor vehicles', 'pharmaceuticals' and 'computer and related activities'. The remaining twelve sectors either showed only very limited changes or seemed to be more affected by the general economic conditions, as their growth path changed with the economic downturn in 2001. The ratio of BERD to researcher numbers differs significantly among the sectors analysed: the 'pharmaceuticals' sector has the highest ratio of expenditures per researcher per year, at over € 350,000, whereas the 'computer and related activities' sector only has about € 140,000 per researcher per year. This ratio was variable in some sectors, although mainly in a downward direction. These trends might be caused by stable (or falling) labour costs and by the changing nature of business R&D, which is making more extensive use of ICT, especially in the development phase.

…..more researchers are working in the business sector as the ratio between business R&D expenditures and number of researchers in the business sector is generally decreasing.

**Do the trends differ significantly among EU Member States?**

**EU Member States showed very diverse trends in business R&D during the last decade driven by the evolution of their economic and research specialisations, but …..**

The significance of BERD as a percentage of GDP varies significantly among Member States, as do the dynamics of BERD growth since the adoption of the Lisbon strategy—clearly some countries are in the process of catching-up (most notably Austria and Spain, but also some New Member States like Cyprus, Malta and Estonia). The service sector was the key driver of BERD growth in some New Member States (the Czech Republic, Slovakia and Lithuania) as well as in the EU-15. As service sector R&D’s share in total BERD still remains low (the largest share is still in manufacturing), total BERD masks rapid growth rates in the service sector. In Spain, Ireland and Portugal, in particular, the service sector already accounts for a larger share of BERD than manufacturing. This suggests that the process of catching-up is also associated with a change in private sector R&D, with a slowing down of manufacturing R&D growth and the establishment of unique competencies in the service sector. These
findings suggest that national economic and research specialisations play a bigger role than is often assumed. Comparisons of the ratio of BERD to researcher numbers in different Member States revealed the expected diversity, which can be partly explained by differences in labour costs, but also by the differing economic structures. The geographical distribution of R&D activities across the EU on the sectoral level showed that manufacturing remains concentrated in just a handful of countries, but that service sector R&D is already more evenly spread. We might observe two complementary trends – one towards the broadening of R&D capacities across the Member States and another towards the development of a limited number of centres of excellence, which are also able to attract a concentration of private R&D investments.

...... in nearly all Member States service sector R&D is booming whereas the high concentration of most of the manufacturing R&D in less than 10 Member States remained stable.

To what extent do governments still fund business R&D directly?

An increased use of indirect funding instruments such as tax incentives and the decrease of government funding of BERD on EU level seems to suggest a decreasing relevance of direct funding, but..........

Over the last decade the share of government funding of BERD (GBERD) decreased constantly in the EU as a whole. This is consistent with policy trends which tend to focus more on indirect support to business R&D expenditures, for instance, through tax incentives. The total amount of public funds to support business R&D, however, grew slightly over the last five years. This might be explained by public funds making up, to some extent, for the reduced business financed BERD during the economic downturn. The pattern of GBERD differs significantly among Member States, with a doubling of funding in Spain and Portugal, and an even bigger increase in the Czech Republic between 1995 and 2003, while there were substantial decreases in Germany, Denmark, the Netherlands and Poland. The findings here are consistent with the Member States' stated policy priorities. On the sectoral level, GBERD play a significant role for some sectors and countries. Especially in the new Member States, government funding often represents the majority of total BERD.

.....in reality the total amount GBERD is again growing in the EU and for some sectors direct governmental funding represents the major share of BERD.

Can national R&D policy priorities to foster business R&D be identified based on R&D statistics?

From R&D statistics it seems that funding for 'General Education' and direct support for 'Industrial Production and Technology' are more relevant policy priorities at EU level than tertiary education and basic research at universities, however.....

For the analysis of Member States' policy choices, a specific analytical approach was developed. The approach is based on the assumption that growth rates of budget appropriations represent a policy priority, at least to a certain extent. It could be observed that 'General Education (all education levels)' and research in support of the 'Industrial Production and Technology' chapter of GBAORD showed very high growth rates at the EU level. The growth rates for university research ('Research funded from General University Funds' - GUF chapter) and 'Tertiary Education' were lower. These findings suggest that priority is given to direct specific measures in R&D and to a general strengthening of the education system rather than specifically to tertiary education. Again, the situation differs when looking at the national level, where four groups of countries can be distinguished: The first group shows a clear focus on university research (GUF-chapter) and general education (all levels of
education). A second group shows a clear focus on universities, in particular on tertiary education and on university research. Of the remaining two groups (each of which include just two countries) the first shows a strong focus on industry research and tertiary education and the other a strong focus on industry related research and with a focus on general education (all education levels). The limits of the analysis presented here are such that no firm conclusions can be drawn on which to base an assessment of national policy priorities.

*...on national level priorities differ and allow for the identification of four different groups of Member States.*