Germany's R&D intensity and innovation activities of SMEs

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Stagnating R&D intensity

Overall economic R&D intensity – i.e. expenditure on research and development (R&D) in relation to gross domestic product (GDP) – represents an important measure for assessing national innovation systems. R&D intensity in Germany fell from 2.98 percent in 2012 to 2.85 percent in 2013. Most of the decline in R&D intensity was attributable to statistical effects. On the one hand, the system of national accounts was changed. Expenditures on R&D are now treated as investment and no longer as pure expenditure; this leads to an increase in GDP and therefore in the denominator for calculating R&D intensity. Using the new national accounts method of calculating GDP, R&D intensity would have been only 2.88 percent (instead of 2.98 percent) in 2012. On the other hand, the figure reported for internal R&D expenditure is lower, due to a change in reporting in the private sector. Without these purely statistical effects, R&D intensity would have remained approximately constant.

After years of continuously rising R&D intensity in Germany, temporary stagnation is not a cause for alarm. Nevertheless, the development is a warning to politicians to continue making a major effort to support research and innovation.

Differences in the development of R&D expenditure in different industries

In addition to the change in R&D intensity, shifts can also be observed in internal R&D expenditure within the private sector: different industries are developing differently. In mechanical and electrical engineering, as in the previous years, R&D expenditure rose (by 4.6 and 3.6 percent respectively). However, it stagnated in pharmaceuticals and in the ICT sector. In the chemical industry, spending on R&D actually fell by 3.7 percent. It also declined in automotive engineering (by 4.6 percent). However, the above-mentioned changes in reporting had an impact here, so that, in fact, R&D expenditure is only stagnating in this latter sector. Even so, to date the positive development of the last few years has not continued since 2012.

Shift from internal to external R&D

There was a relatively large increase in R&D expenditure in the sphere of professional, scientific and technical services: 13.3 percent between 2012 and 2013. The development in the number of R&D personnel employed in these sectors followed a similar course: between 2012 and 2013, employment in R&D rose by 16.1 percent – from approx. 29,900 to approx. 34,700 in terms of full-time equivalents. Parallel to this, there was a shift from internal to external R&D activities in many industries. This development was mainly due to the fact that many companies do less R&D internally, preferring to commission it to specialized companies, R&D service providers or public research institutions.

Innovation dynamics weakening in SMEs?

Innovations by SMEs are particularly important for growth and employment in Germany.[27] In previous reports, therefore, the Commission of Experts already recommended that political decision-makers should pay particular attention to supporting the R&D activities of SMEs.[28] The long-term development of innovation activities by German SMEs is a cause for concern.

Analyses conducted on the basis of the Mannheim Innovation Panel (MIP) show that innovation intensity in SMEs,[29] i.e. the percentage of a company's turnover that is spent on innovation, almost halved from 2.7 percent in 1995 to 1.6 percent in 2012. Over the same period, innovation intensity in large German corporations rose from 3.0 to 4.5 percent.[30] In absolute terms, innovation expenditure by SMEs has only

risen slightly since 1995 and cannot keep pace with the expenditure dynamics of the large corporations.[31] One of the drivers of this decline is the lower overall level of innovation expenditure by those SMEs that only conduct research occasionally. By contrast, expenditure by SMEs that are continuously engaged in R&D has remained stable over the years.

In order to further analyse this development, the Commission of Experts had commissioned the Institute for Employment Research (IAB) to study trends in German corporate employment relevant to innovation.[32] This analysis shows that, on average, the percentage of highly qualified engineers and scientists among the staff of small businesses (with fewer than 100 employees) fell slightly from approximately 2.7 to 2.6 percent between 1999 and 2010. During the same period, the percentage of highly qualified staff rose slightly (from 3.8 to 4.2 percent) in medium-sized companies (100 to 500 employees) and strongly (from 6.0 to 7.1 percent) in large companies (500+ employees).[33] Knowledge intensification in the economy was thus concentrated mainly in large corporations.[34]

Recommendations

The current decline in R&D intensity should not be over-interpreted. However, it must not be taken too lightly either, because even after adjusting for the statistical effects, private-sector R&D expenditure is no longer following the growth trend of the past years of continuous growth. Nevertheless, the Federal Government's three-percent target for R&D intensity by 2015 in Germany (according to the new statistical method) can still be achieved. However, the Commission of Experts points out, as in its 2012 and 2013 reports, that this is an unambitious target. Other countries like Sweden, Japan and Korea left the three-percent mark behind them a long time ago.

Germany considers itself one of the leading economic and innovative nations and should therefore set its sights in future not on the three-percent target, or on average R&D spending by the OECD countries, but on the R&D intensity of the global leaders. In order to close the gap on leading innovative nations in the long term, Germany will have to commit to a more ambitious target for the year 2020: the Commission of Experts regards 3.5 percent of GDP for R&D as both appropriate and necessary.

The growth rates in the number of engineers and natural scientists employed by SMEs in Germany have not kept pace with those recorded by large companies in the past decade. What is more, innovation expenditures in relation to turnover decreased considerably among SMEs between 1995 and 2012. The reasons for this have yet to be resolved, and thus it is still unclear how policies should respond.[35] One possible explanation is that the effects of skilled-labour shortages are much stronger for SMEs than for large corporations. Whatever the reasons, the Commission of Experts expresses general concern regarding these trends and will therefore address this subject in more detail in upcoming Annual Reports.