

RESEARCH, INNOVATION  
AND TECHNOLOGICAL  
PERFORMANCE IN GERMANY

EXPERTENKOMMISSION  
FORSCHUNG  
UND INNOVATION

EFI

# REPORT

2008 2009 2010

2011 2012 2013

2014 2015 2016

2017 2018 2019

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## SUMMARY

### **Education, research and innovation – a particular priority in a recession**

With its export orientation, Germany is particularly vulnerable to the looming global recession. The German Federal Government has implemented economic recovery packages which include important measures to support and stimulate the economy. However, these stimulus packages only contain a few elements which will significantly promote research and innovation. The Expert Commission suggests that in the course of implementing the second recovery package, more attention should be paid to the concerns of education, research and innovation.

If this is not done, there will be a severe shortfall in the funds available in future to improve the competitive position of Germany. Currently, the German innovation system is still competitive in an international comparison. However, competition is becoming considerably more intense as other industrialised countries and some key emerging economies redouble their efforts. Germany's position with respect to R&I will therefore come under pressure if the level of expenditure for research and innovation is only maintained at present levels. There is an urgent need to expand education, research and innovation.

In the view of the Expert Commission, the major task facing R&I policy in Germany over the coming decade concerns the restructuring of the education system. The tax system must also become more innovation-friendly. Specific incentives are needed in the field of innovation financing. It should also not be forgotten that innovations can make a decisive contribution towards countering the global challenge of climate change and promoting the necessary transition to a sustainable economy. R&I policies therefore overlap in important areas with educational policies, fiscal policies, and environmental and energy strategies, and there must be a close dialogue with these sectors. A policy which was confined solely to research and innovation would not have the desired outcome.

### **Financing innovation is even more difficult in the crisis**

Innovation activities are not possible without adequate financing. In companies, equity is by far the most important source of funding for innovation. The moderate levels of equity held by German small and medium-sized enterprises (SMEs) and a poorly developed market for venture capital in international comparison therefore constitute a key weakness of the German innovation system. In 2008, the German parliament passed

the Law on the Modernisation of the Framework Conditions for Venture Capital and Equity Investments (MoRaKG). The aim of this is to promote the provision of capital for young, unlisted companies. Important provisions are still awaiting formal state aid approval from the European Commission. The Expert Commission expects that even with such approval the measures will not lead to a significant strengthening of the German market for venture capital. The effects of the legislation are limited by the very restricted nature of the provisions. Basically, deficits can be identified in the financing of young enterprises and SMEs. The situation is becoming more acute in view of the current crisis. In view of falling profits, the potential for reinvestment in innovations is declining.

The situation on the market for venture capital has also got markedly worse. The volume of external equity provided will very probably decline. The available capital assets will in turn be distributed less widely, and will in particular flow to existing companies – to the disadvantage of new enterprises. As a consequence, a decline in innovation activities of SMEs is to be expected. An improvement in state credit provisions can help the companies which are able to put up adequate securities. However, it does not solve the central problem.

Already in the past it has been possible to observe that the level of expenditure on innovations – in particular in SMEs – is dependent on the state of the economy. In order to reduce this dependency and to ensure less fluctuation in the innovation activities of SMEs, the Expert Commission recommends the introduction of an innovation-friendly tax system and a definite improvement in the framework conditions for venture capital and Business Angels.

### **More attractive framework conditions needed for the science labour market**

In order to boost innovations, Germany needs not only sufficient funding but also more well-trained people. It is true that the number of university graduates reached a record level in 2006. But in order to meet future demand for academics in Germany, considerably more people than in the past must gain qualifications to attend higher education. The expansion and qualitative improvement of the German education system is therefore essential.

After graduating, many academics turn their back on Germany, which had the number of highly-qualified emigrants in an OECD comparison. And it is the particularly successful scientists who really like going to other countries, because they are offered more attractive working conditions than in Germany, and opportunities to gain further qualifications.

In comparison, the migration of academics from other countries to Germany is less well developed. An active immigration and science policy is therefore needed in order to attract highly-qualified foreigners to Germany and to encourage them to stay. This applies in particular to people from countries outside the European Union. The criteria for them to be admitted onto the German labour market are too restrictive, despite recent changes. This situation could be improved significantly by linking the admission of immigrants to their qualifications and by dispensing with income thresholds.

Germany needs attractive framework conditions for its science labour market. The Expert Commission therefore recommends the following measures:

- Strengthening the autonomy of the universities and independent research institutions,
- Public service legislation (*Beamtenrecht*) should not be applied to scientists,
- Federal state legislation on universities should be reformed to allow more flexible employment, with less rigid teaching requirements for professors,
- Provision of sufficient funding for targeting the promotion of young scientists at federal and state levels, and improvement of the support for young scientists by increased teaching opportunities, and travel grants, with the direct allocation of research funds,
- Application of the tenure principle by German universities and minimisation of phases of restricted employment, as well as support for young scientists to develop non-academic careers,
- Regular surveys on the working conditions for scientists in Germany.

### **Intensifying and improving knowledge and technology transfer**

Universities and publicly-supported research institutions are becoming increasingly important for the dynamics of innovation. Both natural sciences and engineering disciplines as well as the humanities and social sciences can contribute to a considerable degree to the development of commercially successful innovations. The pre-requisite for this is the effective organisation of knowledge and technology transfer between science and business.

Knowledge and technology transfer has various forms. A central element is the training activities of the universities and research institutions. The marketing of protective rights and the promotion of new enterprises are currently among the most important functions of the transfer offices. Germany has a long and successful tradition in contract research. However, there is less experience with strategic partnerships, which provide a sound institutional framework for cooperation between public and private partners.

At present, the organisation of knowledge and technology transfers in Germany is not ideal. Unsuitable structures and processes, together with bureaucratic obstacles, often result in a failure to exploit the existing innovative potential. The universities must find the approaches to knowledge and technology transfer which are most suitable for them. There is no standard solution for all institutions. The research and innovation policies should therefore not specify universally binding transfer structures, but should create appropriate framework conditions and provide incentive systems. The Commission of Experts on Research and Innovation therefore recommends the following measures:

- Support for Public Private Partnerships,
- The introduction of a “Period of grace for innovations” in patent law,
- Creation of performance-related incentives for scientists and transfer office team members,
- Development and regular evaluation of further instruments to promote validation research, that is the proof of the commercial utility of research results,
- Easing of constraints on the participation of universities and research institutions participating in spin-off enterprises,
- Full integration at all universities of courses on how to set up new enterprises.

### **Boosting the innovation potential of small and medium-sized enterprises**

Some 70 percent of employees in Germany work for small and medium-sized enterprises. 43 percent of all SMEs in Germany are innovative, that is they bring new or improved products onto the market. Others are R&D service providers which provide support for the innovation

processes of their customers. The importance of SMEs for the German innovation system is considerable.

In an international comparison, the proportion of innovative SMEs in Germany is still high, but it can be seen to be declining if viewed over time. Research and development must generally be funded from company equity. The traditionally low capital ratios of German SMEs therefore represent a constraint on innovation. In addition, the state share of the financing of R&D expenditure of SMEs has fallen almost continually since the end of the 1980s.

In order to increase the innovative potential of small and medium-sized enterprises, the Expert Commission therefore recommends that the German Federal Government adopts a combination of topic-independent R&D support in the tax system and topic-specific support by means of project funding. The Expert Commission therefore sees the need for the following actions:

- The rapid introduction of broad, technology-unspecific fiscal R&D support,
- Further simplification of existing project promotion programmes for SMEs with increased transparency in combination with optimised consultations between the various administrative departments involved,
- Further development of the project promotion by the introduction of two new measures: the status of Young Innovative Company with freedom from taxes and social security contributions for research-intensive new enterprises, as well as the increased consideration of innovative SMEs when placing public orders, analogous to the Small Business Innovation Research (SBIR) programme in the United States of America,
- Increased integration of SMEs in the processes of knowledge and technology transfer, and upgrading the role of universities of applied science in the transfer process.

### **Utilising the innovation and growth potentials of knowledge-intensive services**

The knowledge-intensive services sector is an important engine of growth and employment in Germany and other industrialised countries. Nearly 40 percent of the value created in Germany comes from this sector. It is also responsible for a large part of the growth in employment in recent years.

However, in an international comparison, knowledge-intensive services are still underdeveloped in Germany. Even though the available statistics have to be interpreted with care, the frequently expressed suspicion that the “Services gap” is only a statistical artefact is not accurate. Germany leaves the growth opportunities in this sector unused.

Germany only has a middle ranking when it comes to foreign trade with knowledge-intensive services. In the course of the continued positive development of this sector, more use should be made of the potential of the knowledge-intensive services to increase exports. Problems that can arise in this context from the unwanted leaking of knowledge have to be balanced against the benefits in each individual case.

In order to benefit from the development potential of the knowledge-intensive services sector and in order to allow more accurate analyses, the Expert Commission proposes the following measures:

- Paying increased consideration to the high-value knowledge-intensive services in innovation policy, economic policy, and in the support of foreign trade,
- Providing targeted support for the expansion of trade in the field of product-accompanying services,
- Increasing public awareness about the importance and variety of innovations in the services sector,
- Improved coverage of service activities within the framework of official statistics.