

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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The Expert Commission wishes to emphasise that the positions expressed in the report do not necessarily represent the opinions of the aforementioned persons.

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SUMMARY

A CURRENT DEVELOPMENTS AND CHALLENGES

A 1 FINANCIAL AND ECONOMIC CRISIS

The financial and economic crisis did not leave research and development activities in Germany unaffected. At the same time, the decrease in R&D expenditures seen in 2009 proved to be considerably smaller, percentage-wise, than the decrease seen in the country's gross domestic product. And overall macro-economic R&D intensity, i. e. R&D expenditures' share of the gross domestic product, even rose slightly in 2009 with respect to the previous year, thereby enabling Germany to surpass the U.S. in this indicator for the first time since 1989. German industry's R&D activities re-intensified in 2010, in keeping with favourable economic trends. Nonetheless, Germany's international competitiveness as a center for innovation hinges on further intensification of research and development. The suitable tax incentives for R&D that the Expert Commission has repeatedly called for can provide important incentives in this regard. Policymakers need to show they mean business in this area and at last introduce such incentives.

A 2 VENTURE CAPITAL MARKET

Young companies in Germany face shortages of venture capital. This situation could worsen if German policymakers fail to address it in a suitably measured way. In November 2010, the European Parliament, acting in response to the financial crisis, passed the AIFM Directive, which imposes regulations on managers of alternative investment funds. Even though they present no systemic risks, managers of venture capital funds can fall within the Directive's scope of application. Transposition of the AIFM Directive could thus further shrink the venture capital market for early-phase financing. Such transposition should be taken as an opportunity to draft legislation, finally, for an internationally competitive, growth-promoting tax framework for 'business angels' and venture capital providers.

EDUCATION AND RESEARCH

A 3

The Federal Government has been increasing its investments in education. The Higher Education Pact, the Initiative for Excellence and the Pact for Research and Innovation are all being continued and expanded, and student enrolments at German higher education institutions are growing. Furthermore, PISA results for Germany improved slightly in 2009, over the previous years, even if German school pupils' key competencies are still only about average for OECD countries. Such good news notwithstanding, Germany needs to use its educational resources more effectively. Good innovation policy always depends on good education policy. And good education policy must now include specific improvements in the education sector: The numbers of pupils at risk need to be reduced, model projects at schools need to be properly evaluated and successful projects need to be upscaled to a broad basis. As part of efforts to counter selectivity in the German education system, opportunities need to be improved, for applicants with qualifications for higher education who have non-academic backgrounds, to make the transition to higher education. Furthermore, expanded awarding of *Deutschlandstipendium* national grants ('Germany grants') must not impinge on the work of existing associations for the promotion of the gifted. In the interest of alleviating shortages of skilled specialists and professionals, and of countering disturbing enrolment trends in 'MINT subjects' which include mathematics, engineering and science, efforts need to be intensified to encourage young women to study these subjects. Furthermore, suitable immigration policies, in this regard, are needed at the national and European levels.

STATISTICAL SURVEYS OF INNOVATION ACTIVITIES

A 4

Statistics on research and innovation need to be improved. The timeliness of the available data needs to be improved, statistical inconsistencies need to be eliminated and the quality of statistical surveys of innovation needs to be enhanced. In addition, statistics on start-ups with high growth potential need to be more precise and more reliable. Statistical surveys and analysis of research and innovation would benefit from the creation of an infrastructure project, sited in the social and economic sciences, aimed at 'surveying the knowledge economy'. Such a project would enhance scientists' access to pertinent data.

HIGH-TECH STRATEGY 2020 FOR GERMANY

A 5

The The High-Tech Strategy 2020 for Germany builds on an earlier, related strategy formulated in 2006. In comparison to that earlier version, it provides new direction and greater focus. In addition, it is mission-oriented, concentrating the strategy process on a smaller number of five (now) major priority areas. The Expert Commission welcomes this new strategic direction and its priorities.

The success of the High-Tech Strategy 2020 will depend decisively on its implementation process. For each mission, specific framework-programmes need to be formulated, relevant priorities need to be set, and pertinent aims and measures more clearly defined. In addition, the strategic change brought by the High-Tech Strategy 2020 should be highlighted via greater transparency, including sharper differentiation between new innovation support programmes and updated versions of existing programmes.

A 6 DEVELOPMENT OF THE PATENT SYSTEM

The European patent system is still fragmented. Efforts to create a common EU patent system and to establish a common patent jurisdiction have failed for the time being in the face of resistance to the proposed translation policies. Now, efforts to create an European patent system are to continue within the intensified co-operation framework agreed as part of the Lisbon Treaty. The Expert Commission welcomes this. In creation of an EU patent system, great attention should be given to the quality of the relevant review process. The Expert Commission also again expresses its support for locating the seat of the European patent court in Germany. Further harmonisation is also needed with regard to taxation of income from licensing of patents. The emerging European competition to provide the lowest tax rates needs to be ended as quickly as possible.

A 7 ELECTROMOBILITY

Last year, Germany made substantial progress in the area of electromobility. Numerous research institutions and companies have intensified their research into electromobility. What is more, the Federal Government has modified its strategy for promoting electromobility: now, the strategy is oriented to positioning Germany as a lead provider of marketable electromobility, rather than as a lead market for electromobility. Ideally, German automakers would cooperate closely toward that end. Experience to date has shown that horizontal cooperation between German automakers is difficult to achieve, however. For this reason, state support programmes should seek to strengthen vertical cooperation between automakers, automotive suppliers and pertinent mechanical engineering companies.

CORE TOPICS

B 1 FEDERALISM

In the area of education, the federalism reform of 2006 brought a transition from cooperative federalism to competitive federalism. The joint *Bund-Länder* Commission for Educational Planning and Research Promotion (BLK) was disbanded. What is more, a prohibition on cooperation between the Federal Government and the *Länder* now applies in the area of relevant investments. In financially weaker *Länder*, this has narrowed options for urgently required quantitative and qualitative enhancement of all-day-school programmes.

On the other hand, the federalism reform has left structures for Federal/*Länder* cooperation largely intact in the area of institutional research funding. The financing ratios on which such joint financing is based are complex and varying, however. The manner in which research organisations and institutions are assigned to different ratio categories for distribution of costs between the Federal Government and the *Länder* is not always logically based. That, in turn, leads to problems in the area of relevant discretionary powers.

- In the view of the Expert Commission, elimination of the joint task ‘education planning’ has negative consequences for the development of an effective, efficient education system. As the area of research funding shows, cooperative federalism can

indeed go hand-in-hand with effectiveness and efficiency improvements. The Expert Commission thus recommends that the prohibition on cooperation be rescinded and that the level of cooperative federalism achieved in the education sector, prior to the federalism reform, serves as the basis for further efforts in this area.

- Consistent application of a Federal/*Länder* financing ratio of roughly 70:30 for all independent research institutions could make current financing practice considerably simpler and more transparent, while also countering any political (and fiscal) instrumentalisation of research funding. Furthermore, introduction of a standardised home-state (*Land*) share of 25 percent in the case of multilaterally funded research organisations could help ensure that all *Länder* remain able to afford to host cutting-edge research in independent research institutions.
- The Initiative for Excellence and the Pact for Research and Innovation have provided successful incentives for intensified cooperation between higher education institutions and independent research institutions. Over the past few years, such cooperation has been institutionalised at some locations. The Expert Commission recommends that use of such cooperation approaches be expanded, in the context of preservation of applicable regional or subject-specific characteristics. A standardised financing ratio for financing of cooperating independent research institutions would facilitate the establishment of efficient models for cooperation.

EUROPEAN DIMENSION OF R&I POLICY

B 2

Since 2000, in the context of the common ‘European Research Area’, the EU has been working to bring its Member States’ R&I policies, which are still nationally oriented, into a coherent European R&I policy framework. The effort is designed to prevent duplication and fragmentation – and build Europe into a globally leading research centre. An effective European innovation and research system urgently needs to be created, since no European country could now, on its own, successfully face the growing competition from Asia and North America. Creation of a European Research Area (ERA) is thus the key to successful national research and innovation policy.

Designing the relevant political and administrative structures, and support instruments, has proven to be a complex process in the real world, however. More coordination – and less bureaucracy – are urgently needed in this area. In the interest of furthering ‘Europeanisation’ of national R&I policies and making them more effective, the Expert Commission recommends the following:

- In coordinating their R&I activities, individual Member States should be permitted to take the initiative via cooperation arrangements with ‘variable geometry’. The focussing on specific fields of competence that such flexibility entails can enhance the EU’s overall competitiveness.
- Relevant support measures, such as the Structural Funds and the Framework Programme, should be more clearly set off from each other.
- The support activities of the European Research Council (ERC) have been well received, and the ERC has achieved a high measure of credibility within the European research system. Many of the German scientists who have received funding are now pursuing their research abroad, however, and German universities are not attracting enough foreign researchers. The German research system needs to become more attractive.

- In the interest of efforts toward Europe's research leadership, institutionalised research cooperation should be reinforced with a 'European Initiative for Excellence' in the medium term. Via suitable networks, leading European higher education institutions could be developed into drivers of cutting-edge basic research. The primary criterion for assessing such efforts should be scientific excellence.
- The cost explosion seen in the construction of the ITER fusion reactor shows that the Federal Government urgently needs to work for efficient management structures in major European projects.

B 3 NETWORK NEUTRALITY AND INNOVATION

The Internet, one of the global economy's most innovation-friendly 'locations', is about to undergo profound changes. Originally, the Internet was 'blind' to applications, i. e. it was not possible in the Internet to distinguish data packets of different applications, services and content. That limitation has been disappearing. Increasingly, network operators are able to analyse data packets in real time and prioritise, delay or block them in keeping with their own interests. This trend could lead to the loss of two keys to the innovative power of the Internet: in the Internet, innovations do not necessarily require major investments, and new applications can be introduced to markets quickly and cost-effectively. In the interest of innovation in the Internet, the Expert Commission recommends the following:

- Blocking of applications and content should be prohibited.
- All Internet subscribers must be granted a maximum level of transparency, along with the right to switch Internet providers quickly and easily.
- Where capacity bottlenecks occur in the network, price differentiation in accordance with quality levels is justified. At the same time, the network must offer quality-of-service classes on a non-discriminatory basis. In each case, the decision as to which quality-of-service class a given application is to receive must be left solely up to the end user.
- To prevent any strategically motivated hindering of data traffic, the Federal Network Agency (BNetzA) should establish minimum requirements for quality of service, and it should be able to monitor relevant violations and penalise offenders.

B 4 INNOVATION WITHOUT RESEARCH AND DEVELOPMENT

A significant number of innovating companies in Germany do not rely on research and development in the conventional sense. It can be useful to provide support for such companies in cases in which the support enhances use of existing knowledge, and in which it enables innovative companies without R&D to carry out research on an ongoing basis. The Expert Commission thus recommends:

- The barriers to inclusion of innovative companies without R&D, within federal support programmes, should be lowered.
- Cooperation between innovative companies without R&D and scientific institutions should be facilitated.
- Federal and *Länder* programmes relative to 'innovation vouchers', a support instrument, need to be reviewed.
- Taxation-based R&D incentives should be used to support companies in undertaking R&D activities or continuing such activities throughout the long term.

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