

RESEARCH, INNOVATION
AND TECHNOLOGICAL
PERFORMANCE IN GERMANY

COMMISSION OF EXPERTS
FOR RESEARCH
AND INNOVATION

EFI

REPORT

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2022 2023 2024

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

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Executive Summary

A Current Developments and Challenges

A 1 Social innovations – no paradigm shift in R&I policy

Not only technological but also social innovations can help solve societal challenges. However, social innovations are not sufficiently taken into consideration in German R&I policy, which has thus far been dominated by a technological understanding of innovation. The Commission of Experts therefore calls on the Federal Government to focus its attention more on social innovations and to experiment with new forms of participation and with suitable funding instruments, such as inducement prizes.

However, in the view of the Commission of Experts, taking greater account of social innovations does not require a fundamental paradigm shift in the current R&I policy. There is no need for specific criteria in the funding concept that distinguish between social and technological innovations. As in other fields, public funding should only be invested if markets fail. Public funding for social innovations should primarily support the development, research and testing of new ideas for changing social practices. Furthermore, social innovations should also only be supported if they show sufficient potential for economic sustainability. This assessment by the Commission of Experts should not be misunderstood as advocating permanent subsidies for social innovations.

In a similar way to the support and funding that is dedicated to technological innovations, support and funding for social innovations should in principle be systematically and scientifically assessed, supervised and subsequently evaluated.

A 2 Patent boxes – no substitute for R&D tax credits

A number of European countries have introduced tax schemes, known as patent boxes, that grant a reduced tax rate on income from intangible assets like patents. The arguments given to justify this policy are that it promotes innovative activities that create jobs for highly qualified people and generate knowledge. However, empirical evidence does not suggest that a low level of taxation on income from patents leads to an increase in domestic R&D activities.

A patent box scheme is not an equivalent alternative to R&D tax credits. Patent boxes are a fundamentally less suitable instrument for domestically promoting R&D, since they apply to the income from patents, not directly to the R&D activities themselves. Although the Commission of Experts welcomes the international harmonisation of corporate taxation (base erosion and profit shifting – BEPS) launched by the G20 group, it is sceptical about the design of the Nexus Approach. In general, the Commission of Experts recommends

that the Federal Government should work in the international context towards the complete abolition of patent box schemes. The Commission of Experts considers the introduction of tax credits to fund R&D to be urgently necessary in order to promote R&D in Germany.

A 3 Current challenges for tertiary education policy

The differentiation of the tertiary education sector should be further intensified under the planned continuation of the Excellence Initiative. Universities that perform particularly well should continue to receive institutional funding in the future. Furthermore, regarding the continuation of the Excellence Initiative, support should be guaranteed for outstanding research structures that are particularly focused on specific issues or disciplines and are internationally recognised. The institutions to be funded should be selected within the framework of a scientific competition procedure.

In order to be able to attract the best talent also in the context of international competition young scientists must be offered attractive working conditions and career prospects. Additional W2 and W3 professorships and more tenure-track career positions should be created over the next few years.

Tertiary education institutions must develop strategies to make better use of the opportunities offered by digitisation. In this context they should be supported by identifying and promoting examples of best practice. The Federal Government could furthermore provide institutional funding for individual institutions to encourage the implementation of particularly ambitious digitisation strategies.

Tertiary education institutions and political decision-makers must also work together to ensure that potential students among refugees gain quick and unbureaucratic access to the German tertiary education system.

B Core Topics 2016

B 1 The contribution of SMEs to research and innovation in Germany

Small and medium-sized enterprises (SMEs) are considered one of the strengths of the German economy. In this context, emphasis is placed primarily on their great importance for employment and innovation. However, SMEs are a heterogeneous group when it comes to their innovation performance.

The innovation intensity and innovation expenditure of German SMEs are low by international comparison. By contrast, patent activities and innovation successes reveal a mixed picture. While German SMEs are leaders in terms of the frequency of product or process innovations, their ranking is only average by European comparison when it comes to patent intensity and the share of revenues that is generated with new products.

The most widespread obstacles to innovation are excessive innovation costs and excessive economic risks followed by the lack of skilled personnel and the lack of internal sources of finance.

In most comparable countries, there exists not only direct funding but also R&D tax credits. In these countries, the percentage of R&D expenditure by SMEs financed from public sources is significantly higher than in Germany, where R&D tax credits do not exist.

The Commission of Experts recommends the following measures:

- The current funding instruments should be supplemented by the introduction of R&D tax credits, paying special attention to the needs of SMEs.
- Germany must make major efforts to counteract the decline in start-up rates – also by attracting foreign entrepreneurs.
- In order to improve the framework conditions for venture capital and thus to create more financing options for innovative companies, the legal foundations announced in the coalition treaty must finally be laid. This should include facilitating the private financing of business start-ups.
- The supply of skilled personnel should be increased overall. Political decision-makers, chambers of commerce, and associations should intensify their support measures for SMEs that recruit foreigners for skilled jobs, and launch a corresponding information campaign.
- The structure of the funding programs at the federal level should be regularly reviewed – and simplified if there is excessive complexity or duplication in the range of funding options.
- The SME funding programs must be evaluated according to current scientific standards. The results of the evaluation should be published and the collected data should be made accessible for further scientific analyses.

B 2 Robotics in transition

Robots have been in use in industrial production for more than 50 years. Initially they performed monotonous, dangerous or physically strenuous tasks within production processes. Nowadays, in many sectors of the economy, potential applications of modern robots also exist beyond the industrial production, namely in the provision of services by so-called service robots. By international comparison, Germany is currently still well positioned in the use of robots in industrial production, particularly in vehicle construction. However, competition is growing in robotics nations such as the USA, Japan, South Korea and China. In addition, service robotics is gaining economic importance: Forecasts predict that it will even overtake the importance of industrial robotics in the near future. Germany is currently not well positioned in this field.

The Commission of Experts recommends the following:

- The Federal Government should develop an explicit robotics strategy, like the ones other countries already have. This strategy should provide appropriate public support that takes the growing importance of service robotics into account.
- A critical view must be taken of the very high concentration of robot use in the German automotive industry. Funding programs should give more consideration to the potential of modern robots in sectors outside of the automotive industry.
- Tertiary education institutions must place greater emphasis on robotics research. Spin-offs from research should be given stronger support than in the past.
- The requirements and opportunities of an increased use of robots must be taught in the dual system of vocational training. It is important not only to target the application of robots in the industrial sector, but also to increasingly focus on the use of service robots.
- Life-long learning, and with it further-training courses in robotics applications and development should be systematically expanded for graduates of both vocational training and tertiary education. Massive Open Online Courses (MOOCs) represent a great opportunity in this context.
- In higher education there should be more interaction between engineering and IT training study programs. At the same time, course elements focusing specifically on robotics should be strengthened.

B 3 Business models of the digital economy

Digitisation and connectedness are creating new opportunities for action and are confronting businesses, policy-makers and society with major challenges. The economic importance of data-driven services and business models for value creation has increased considerably over the last years. New intermediaries are increasingly dominating the strategically important access to end customers and threatening the positions of incumbent firms. Software- and internet-based technologies, such as cloud computing and big data, enable disruptive innovations that have far-reaching consequences. Up to now, Germany has not been able to build up capabilities either in the classical ICT industry or in the new, internet-based sectors of the digital economy. Policy-makers in Germany have failed to create sound framework conditions for new business models; rather, they have tended to trust in incumbent structures and models.

Against this background, the Commission of Experts states the following:

- The Federal Government's strong focus on a relatively small area of digitisation is unlikely to yield the intended results. For example, Industry 4.0 one-sidedly targets efficiency gains in the field of manufacturing technology. Similarly, other industry- or application-specific initiatives such as Smart Service Welt or eHealth are limited in their ability to generate positive funding effects across the broad range of digital applications. There is an urgent need for a convincing overall strategy. The 'Digital Agenda' does not meet this requirement, despite the fact that it delivers a helpful collection of analyses and necessary actions.
- Currently, start-ups that are developing new sources of value creation with ambitious business-model innovations have insufficient access to venture capital and growth finance in Germany. The Commission of Experts reiterates its recommendation to work towards improving the framework conditions for venture capital and setting up a stock-exchange segment for high-growth companies.
- Skill development in handling digital technologies and business models should be supported across the board – in all education and training segments.

B 4 E-Government in Germany: much room for improvement

E-government (electronic government) stands for using information and communication technologies based on electronic media to run governmental and administrative processes. E-government represents an innovation in the public sector. Consistently implemented, it provides significant potential for value creation and can greatly improve the quality of services provided for citizens by public authorities.

In their 2010 national e-government strategy, the Federal Government, the Länder and the municipalities formulated the goal of making Germany's e-government the international standard for effective and efficient administration by 2015. Various studies show, however, that Germany's e-government is clearly lagging behind by international comparison.

This deficit primarily reflects a limited and not very user-friendly range of e-government services. Germany is thus letting important potential for innovation and value creation untapped.

The Commission of Experts therefore recommends the following:

- The Federal Government should significantly intensify activities to create and develop a central e-government portal as well as an open-data portal for the provision of open government and administration data.

- The e-government portal should offer as many services as possible from the Federal Government, Länder and municipalities in concentrated form, arranged according to the concerns they address, and in the form of a one-stop shop for citizens and businesses. The existing data portal for Germany, GovData, should be developed into an open data portal that makes available the topical data of the Federal Government, Länder and municipalities in machine-readable format for further use.
- The mere provision of e-government offerings and large amounts of data is not enough, and this applies both to the e-government portal and to the data portal. Rather, the expansion of services offered by e-government must go hand in hand with an improvement in user friendliness.
- The development of a comprehensive, digitally integrated e-government service requires the introduction of binding milestones for the Federal Government, Länder and municipalities. The Federal Government should create a central coordination office for e-government in the Chancellery. This should be supported by the IT Planning Council, which must be equipped with the corresponding authority to ensure the constructive cooperation of all stakeholders.

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