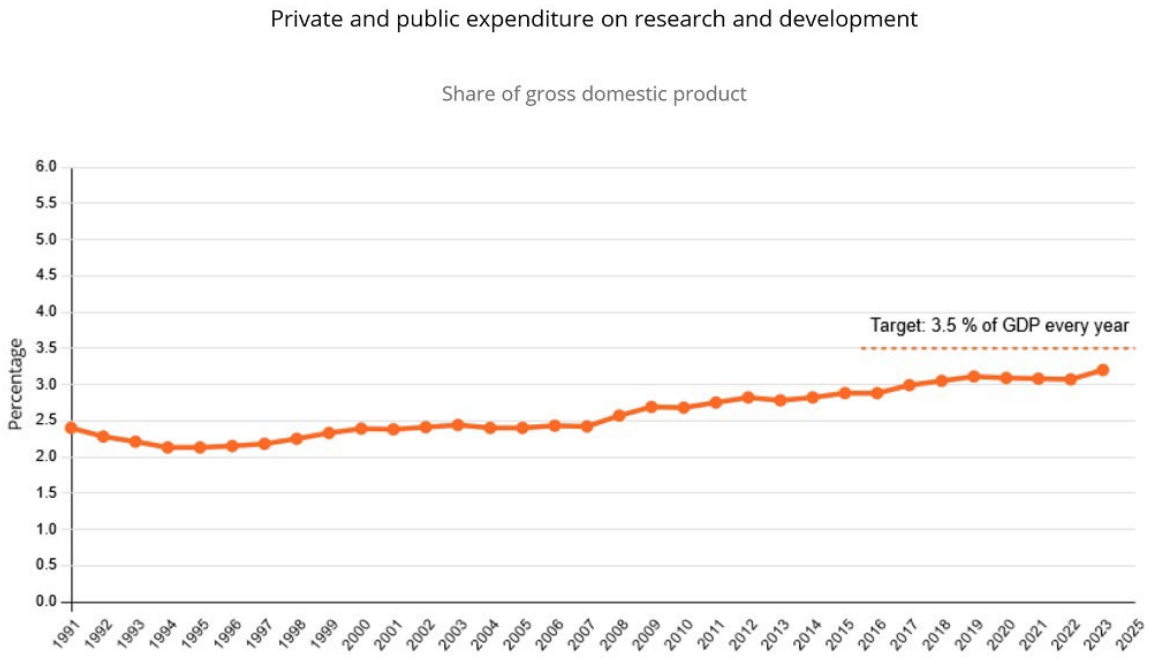
Innovation – *Shaping the future sustainably with new solutions*

9.1.a Private and public expenditure on research and development



Note(s):
Until 2010, including external expenditures for research and development. – Calculation methodology changed as of 2016. – Gross domestic product calculation basis: January 2025.

Data source(s):
Federal Statistical Office, Stifterverband Wissenschaftsstatistik

Definition
The indicator shows internal expenditure on research and development (R&D) by industry, the state and universities in relation to gross domestic product (GDP) (as a percentage).

Intention
Expenditure on research and development (R&D) is an important, if not the sole, determinant of the pace of innovation in an economy. The higher the expenditure, the greater the likelihood of a more dynamic development in productivity, stronger economic growth and improved competitiveness.

Target
At least 3.5% of gross domestic product (GDP) per year by 2025

Content and progress
Research and Development (R&D) comprises scientific activities defined as creative and systematic work undertaken to increase the stock of knowledge – including knowledge of humanity, culture, and society – and to devise new applications based on existing know-

ledge. A significant element of novelty or further development serves as the central criterion distinguishing R&D from related activities.

The share of R&D expenditure in Gross Domestic Product (GDP) is determined annually by the Federal Statistical Office. Total R&D expenditure includes spending by the government sector (including non-profit private research institutions), higher education institutions, and the business enterprise sector. The surveys and calculations follow the methodological guidelines of the Frascati Manual issued by the Organisation for Economic Co-operation and Development (OECD), thereby ensuring international comparability.

In 2023, total R&D expenditure in Germany amounted to 132.0 billion euros according to preliminary figures. This corresponded to 3.2% of GDP, falling 0.3 percentage points short of the politically defined target of at least 3.5% of GDP per year. Since 2000, the R&D-to-GDP ratio in Germany has increased by 0.8 percentage points. In total, R&D expenditure has doubled over this period. In the first year of the COVID-19 pandemic (2020), R&D expenditure declined by 3.4 billion euros compared to 2019. This decrease was exclusively attributable to the business enterprise sector, whereas the other two sectors recorded increases.

In 2023, the largest share of R&D expenditure in Germany – 68.5% – was attributed to the business sector, followed by 17.4% in the higher education sector and 14.1% in government and non-profit private research institutions. A total of 824,396 individuals (measured in full-time equivalents) were employed in R&D, with only the proportion of their working time dedicated to R&D activities being included. Of this workforce, 65.9% were employed in the business sector, 19.1% in higher education institutions, and 14.9% in government and non-profit private research institutions.

In a European comparison, Germany's R&D-to-GDP ratio of 3.1% in 2023 exceeded the EU-27 average of 2.2%. Higher ratios were recorded in Sweden (3.6%), Belgium (3.3%), and Austria (3.3%). At the national level, Baden-Württemberg reported the highest R&D intensity at 5.7% of GDP, followed by Rheinland-Pfalz at 3.6%, Bayern at 3.4% and Berlin at 3.1% and Hessen at 3.0%.

Type of target
Constant target for each year

Assessment
Private and public expenditures on research and development should amount to at least 3.5% of gross domestic product each year.

According to the target formulation, the politically defined target value was again not achieved in 2023. However, since the six-year average development does not indicate any deterioration, indicator 9.1.a is assessed as cloud for 2023.