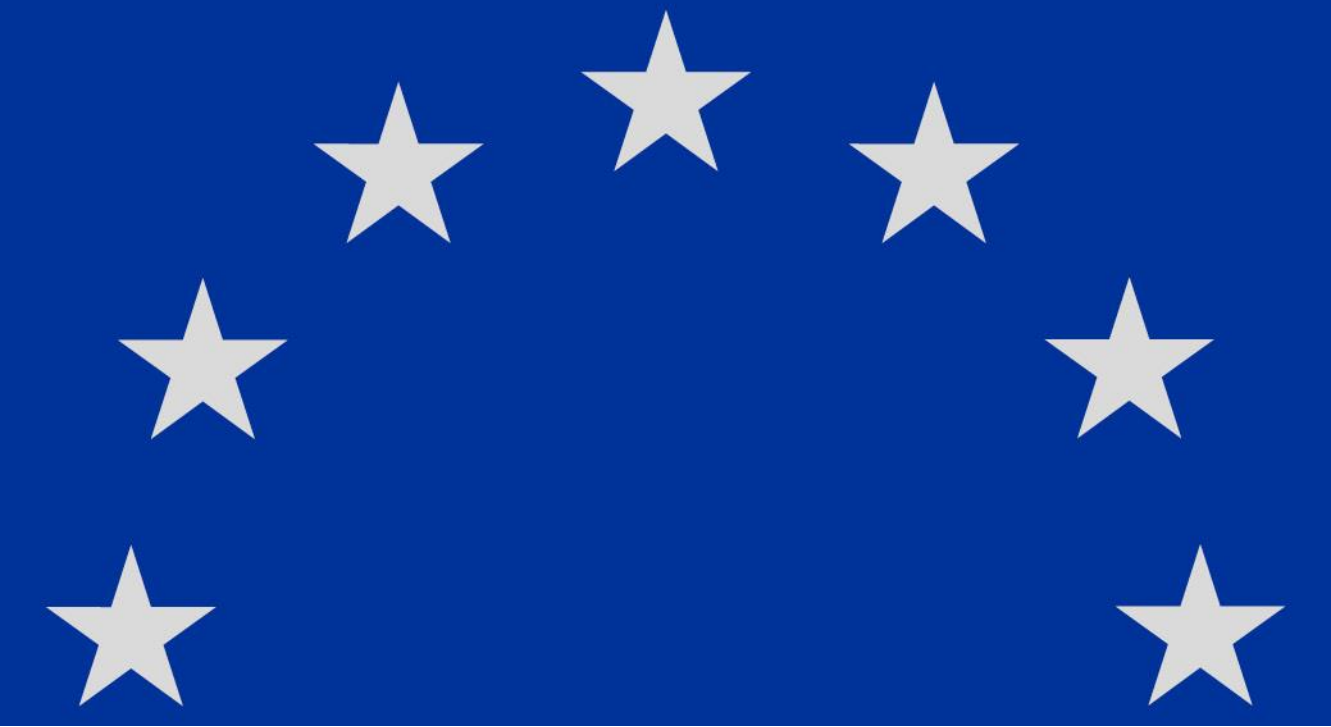
European Commission

Research and Innovation

# European Innovation Scoreboard 2025

## Methodology report

Independent Expert Report



**European Innovation Scoreboard 2025 – Methodology report**

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Manuscript completed in July 2025



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EUROPEAN COMMISSION

# European Innovation Scoreboard 2025

## Methodology report

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# 1. Introduction

The annual European Innovation Scoreboard (EIS) provides a comparative assessment of the research and innovation performance of the EU Member States and the relative strengths and weaknesses of their research and innovation systems. It helps Member States assess areas in which they need to concentrate their efforts to boost their innovation performance.

The first edition of the EIS was published in 2001. The EIS measurement framework was revised for the 2025 edition. There have been several methodology revisions to the EIS over time, with the latest prior major revision in 2021.

Section 2 discusses the measurement framework for the EIS 2025. Section 3 presents definitions for all the indicators. Section 4 provides a detailed discussion of the methodology used for calculating the Summary Innovation Index. Section 5 provides the definitions of the contextual indicators included in the EIS 2025 Country profiles.

All data and processed results are available in the EIS 2025 database.

# 2. EIS Measurement Framework

The EIS 2025 distinguishes between four main pillars – Framework conditions, Investments, Innovation activities, and Impacts – and 12 innovation dimensions, capturing in total 32 indicators. Each main pillar includes an equal number of indicators and has an equal weight in the Summary Innovation Index.

**Framework conditions** capture the main drivers of innovation performance external to the firm and differentiates between three innovation dimensions:

- The Human resources dimension includes three indicators and measures the availability of a high-skilled and educated workforce. It includes three indicators, New doctorate graduates in STEM, Population aged 25-34 with completed tertiary education, and Population aged 25-64 involved in lifelong learning activities.

- Attractive research systems measure the international competitiveness of the science base by focusing on International scientific co-publications, Most cited publications, and Foreign doctorate students.

- Digitalisation measures the level of digital technologies and includes two indicators, High-speed internet and (the supply of) Individuals with above basic overall digital skills.

**Investments** capture investments made in both the public and business sector and differentiates between three innovation dimensions:

- The Finance and support dimension is based on three indicators including private funding (Venture capital investments), R&D expenditures in universities and government research organisations, and Direct government funding and government tax support for business R&D.

- Firm investments measure R&D and Non-R&D investments that firms make to generate innovations, including Business R&D expenditures, Non-R&D innovation expenditures, and Innovation expenditures per person employed.

- Use of information technologies captures the use of information technologies based on two indicators: Cloud computing in enterprises and Employed ICT specialists.

**Innovation activities** capture different aspects of innovation in the business sector and differentiate between three innovation dimensions:

- The Innovators dimension includes two indicators measuring the introduction of innovations by SMEs on the market or within their organisations, covering both products and business process innovators.

- The Linkages dimension assesses the connections existing in the innovation ecosystem by measuring Collaboration efforts between innovating firms, Research collaboration between the private and public sector, and Job-to-job mobility of Human Resources in Science & Technology (HRST).

- Intellectual assets measure the performance in different forms of Intellectual Property Rights (IPR): PCT patent applications, Trademark applications, and Design applications.

**Impacts** capture the effects of enterprises' innovation activities and differentiate between three innovation dimensions:

- Employment impacts measure the impact of innovation activities on employment based on two indicators: Sales of new-to-market and new-to-firm innovations and Employment in innovative enterprises.

- Sales impacts measure the economic impact of innovation and includes three indicators: Exports of medium and high-tech products, Exports of knowledge-intensive services, and High-tech imports from partners outside of the EU27.

- Environmental sustainability captures improvements towards the reduction of negative environmental impacts, based on three indicators: Resource productivity, Production-based CO2 productivity, and Labour productivity.

Chapter 3 provides the details on the definition, calculation and interpretation of each indicator.

*Figure 1 Indicators included in the EIS 2025 measurement framework*


*Legend*
● *New indicator*

# 3. EIS Indicators

This chapter provides the definition, interpretation and data source for each indicator. For data from Eurostat, the code used by Eurostat is also provided. For some indicators more than one data source has been used, e.g. R&D expenditure data are taken from Eurostat, but for countries not covered by Eurostat, data from the OECD, UNESCO or national sources have been used.

## Human Resources

| 1.1.1 New doctorate graduates in science, technology, engineering, and mathematics (STEM) per 1000 population aged 25-34 | |
|---|---|
| Numerator | Number of doctorate graduates in science, technology, engineering, and mathematics (STEM) |
| Denominator | Population between and including 25 and 34 years |
| Interpretation | The indicator is a measure of the supply of new second-stage tertiary graduates in all fields of training (ISCED 8). For most countries, ISCED 8 captures PhD graduates. There is a complex relation between STEM-graduates and innovation in the private sector. STEM-graduates do well as employees within firms with many of them taking up managerial positions. |
| Data source | Eurostat (variable code: educ_uoe_grad07); OECD Education and Training, https://stats.oecd.org, June 2025 |

| 1.1.2 Percentage population aged 25-34 having completed tertiary education | |
|---|---|
| Numerator | Number of persons in age class with some form of post-secondary education |
| Denominator | Population between and including 25 and 34 years |
| Interpretation | This is a general indicator of the supply of advanced skills. It is not limited to science and technical fields, because the adoption of innovations in many areas, in particular in the service sectors, depends on a wide range of skills. The indicator focuses on a relatively young age cohort of the population, aged 25 to 34, and will therefore easily and quickly reflect changes in educational policies leading to more tertiary graduates. |
| Data source | Eurostat (variable code: edat_lfse_03); OECD Education and Training, https://stats.oecd.org |

| 1.1.3 Percentage population aged 25-64 participating in lifelong learning | |
|---|---|
| Numerator | The target population for lifelong learning statistics refers to all persons in private households aged between 25 and 64 years. The information collected relates to all education or training, whether or not relevant to the respondent's current or possible future job. Data are collected through the EU Labour Force Survey. The reference period for the participation in |

| 1.1.3 Percentage population aged 25-64 participating in lifelong learning | |
|---|---|
| | education and training is the four weeks preceding the interview, as is usual in the Labour Force Survey. |
| Denominator | Total population of the same age group, excluding those who did not answer the question concerning participation in (formal and non-formal) education and training |
| Interpretation | Lifelong learning encompasses all purposeful learning activity, whether formal, non-formal or informal, undertaken on an ongoing basis with the aim of improving knowledge, skills and competence. The intention or aim to learn is the critical point that distinguishes these activities from non-learning activities, such as cultural or sporting activities. |
| Data source | Eurostat (variable code: trng_lfs_01); Population data from Eurostat (variable code: demo_pjan) |

## Attractive research systems

| 1.2.1 International scientific co-publications per million population | |
|---|---|
| Numerator | Number of scientific publications with at least one co-author based abroad. |
| Denominator | Total population. |
| Interpretation | International scientific co-publications are a proxy for the quality of scientific research as collaboration increases scientific productivity.<br>For individual countries all publications with at least one co-author outside the country are included, For the EU only publications with at least one co-author in a non-EU Member State are included |
| Data source | Scopus database. Data calculated by Science-Metrix for the European Commission (DG Research and Innovation); Population data from Eurostat (variable code: demo_pjan), June 2025 |

| 1.2.2 Scientific publications among the top-10% most cited publications worldwide as percentage of total scientific publications of the country | |
|---|---|
| Numerator | Number of scientific publications among the top-10% most cited publications worldwide |
| Denominator | Total number of scientific publications |
| Interpretation | The indicator is a measure for the quality of the research system, as highly cited publications are assumed to be of higher quality. There could be a bias towards small or English-speaking countries given the coverage of Scopus' publication data. |
| Data source | Scopus database. Data calculated by Science-Metrix for the European Commission (DG Research and Innovation) |

| 1.2.3 Foreign doctorate students as a percentage of all doctorate students | |
|---|---|
| Numerator | Number of doctorate students from foreign countries |
| Denominator | Total number of doctorate students |
| Interpretation | The share of foreign doctorate students reflects the mobility of students as an effective way of diffusing knowledge. Attracting high-skilled foreign doctorate students will secure a continuous supply of researchers. |
| Data source | Eurostat (variable code numerator: educ_uoe_mobs01; variable code denominator: educ_uoe_enra03) |

### Digitalisation

| 1.3.1 High-speed internet access | |
|---|---|
| Numerator | Number of households with fixed very high capacity network (VHCN) connection |
| Denominator | Total number of households |
| Interpretation | This indicator measures the share of households with a fixed Very High-Capacity Network (VHCN) connection. A VHCN refers to an electronic communications network that either consists entirely of optical fibre elements up to at least the distribution point at the serving location or delivers comparable network performance under usual peak-time conditions. This indicator reflects the quality of a country's digital infrastructure. |
| Data source | Eurostat (variable code: sdg_17_60) |

| 1.3.2 Individuals who have above basic overall digital skills (% share) | |
|---|---|
| Numerator | Number of individuals with above basic overall digital skills |
| Denominator | Individuals aged 16-74 |
| Interpretation | Above basic overall digital skills represent the highest level of the overall digital skills indicator, which is a composite indicator based on selected activities performed by individuals aged 16-74 on the internet in four specific areas (information, communication, problem solving, content creation) during the previous 3 months. |
| Data source | Eurostat, EU survey on the ICT usage in households and by individuals (variable code: isoc_sk_dskl_i) |

### Finance and support

| 2.1.1 R&D expenditure in the public sector (percentage of GDP) | |
|---|---|
| Numerator | All R&D expenditures in the government sector (GOVERD) and the higher education sector (HERD) |
| Denominator | Gross Domestic Product |

| 2.1.1 R&D expenditure in the public sector (percentage of GDP) | |
|---|---|
| Interpretation | R&D expenditure represents one of the major drivers of economic growth in a knowledge-based economy. As such, trends in the R&D expenditure indicator provide key indications of the future competitiveness and wealth of the EU. Research and development spending is essential for making the transition to a knowledge-based economy as well as for improving production technologies and stimulating growth. |
| Data source | Eurostat (variable code: rd_e_gerdtot) |

| 2.1.2 Venture capital expenditures (percentage of GDP) | |
|---|---|
| Numerator | Venture capital expenditures is defined as private equity being raised for investment in companies. Management buyouts, management buy-ins, and venture purchase of quoted shares are excluded. Venture capital includes early- stage (seed + start-up) and expansion and replacement capital. |
| Denominator | Gross Domestic Product |
| Interpretation | The amount of venture capital is a proxy for the relative dynamism of new business creation. In particular for enterprises using or developing new (risky) technologies, venture capital is often the only available means of financing their (expanding) business. |
| Data source | Venture capital data from Invest Europe. GDP data from Eurostat (variable code: nama_10_gdp) |

| 2.1.3 Direct government funding and government tax support for business R&D (percentage of GDP) | |
|---|---|
| Numerator | Sum of GTARD and Direct funding of BERD |
| Denominator | Gross Domestic Product |
| Interpretation | Public financing of R&D can take two forms: Direct funding for R&D through instruments such as grants and public procurement, and Indirect support through the tax system.<br><br>Direct funding is well captured in the official data on R&D expenditure by source of fund, differentiating between the following sources: Business enterprise sector, Government sector, Higher education sector, Private non-profit sector, and Abroad. Data on R&D funded by the Government sector are available from Eurostat (EU Member States and other European countries), OECD (OECD member states) and UIS (global coverage). Over time, more and more countries have introduced R&D tax incentives. The OECD has started to systematically collect data on R&D tax incentives since 2018 and with the support of the EC data are currently being collected on an annual basis and made available in the 'OECD R&D Tax Incentives database'. |
| Data source | OECD R&D Tax Incentive Database, http://oe.cd/rdtax |

### Firm investments

| 2.2.1 R&D expenditure in the business sector (percentage of GDP) | |
|---|---|
| Numerator | All R&D expenditures in the business sector (BERD) |
| Denominator | Gross Domestic Product |
| Interpretation | The indicator captures the formal creation of new knowledge within firms. It is particularly important in the science-based sectors (pharmaceuticals, chemicals and some areas of electronics) where most new knowledge is created in or near R&D laboratories. |
| Data source | Eurostat (variable code: rd_e_gerdtot) |

| 2.2.2 Non-R&D innovation expenditures (percentage of turnover) | |
|---|---|
| Numerator | Sum of total innovation expenditure for enterprises, excluding intramural and extramural R&D expenditures |
| Denominator | Total turnover for all enterprises |
| Interpretation | This indicator measures non-R&D innovation expenditure as a percentage of total turnover. Several of the components of innovation expenditure, such as investment in equipment and machinery and the acquisition of patents and licenses, measure the diffusion of new production technology and ideas. |
| Data source | Eurostat (Community Innovation Survey) (variable code: numerator: inn_cis13_exp; denominator: inn_cis13_bas) |

| 2.2.3 Innovation expenditures per person employed | |
|---|---|
| Numerator | Sum of total innovation expenditure by enterprises in all size classes in Purchasing Power Standard (PPS) |
| Denominator | Total employment in innovative enterprises in all size classes |
| Interpretation | The indicator measures the monetary input directly related to innovation activities. |
| Data source | Eurostat (Community Innovation Survey) (variable code: numerator: inn_cis13_exp; denominator: inn_cis13_bas) |

### Use of information technologies

| 2.3.1 Cloud computing in enterprises | |
|---|---|
| Numerator | Enterprises with 10 or more persons employed that reported using cloud computing services |
| Denominator | Total number of enterprises with 10 or more persons employed |
| Interpretation | Cloud computing refers to ICT services used over the internet to access software, computing power, storage capacity, etc. This indicator reflects the percentage of enterprises using at least one intermediate or sophisticated cloud computing services: finance or accounting software applications, enterprise resource planning (ERP) software applications, customer relationship management (CRM) software applications, security software |

| 2.3.1 Cloud computing in enterprises | |
|---|---|
| | applications, hosting the enterprise's database(s), and computing platform providing a hosted environment for application development, testing or deployment. This indicator is relevant for analysing the digitalisation of enterprises. Data is collected yearly by national statistical institutes using the annual Eurostat model questionnaires on ICT usage and e-commerce in enterprises. |
| Data source | Eurostat (variable code: isoc_cicce_use) |

| 2.3.2 ICT specialists (as a percentage of total employment) | |
|---|---|
| Numerator | Number of employed ICT specialists |
| Denominator | Total employment |
| Interpretation | Eurostat defines ICT specialists as "workers who have the ability to develop, operate and maintain ICT systems, and for whom ICT constitute the main part of their job". Operationalised in terms of ISCO codes, this definition converts into a statistical definition of ICT specialists as follows: from 2012 onwards - corresponding to the application of the ISCO-08, Eurostat and OECD adopted a joint approach to define the occupations to be treated as ICT specialists (OECD, 20161). |
| Data source | Eurostat (variable code: isoc_ske_ittn2); OECD Data Explorer, April 2024; UNECE Statistical database, April 2024 |

## Innovators

| 3.1.1 SMEs introducing product innovations (percentage of SMEs) | |
|---|---|
| Numerator | Number of Small and medium-sized enterprises (SMEs) who introduced at least one product innovation either new to the enterprise or new to their market |
| Denominator | Total number of Small and medium-sized enterprises (SMEs) |
| Interpretation | Product innovation is a key ingredient to innovation as it can create new markets and improve competitiveness. Higher shares of product innovators reflect a higher level of innovation activities. |
| Comment | SMEs are defined as including all enterprises with 10 to 249 employees. |
| Data source | Eurostat (Community Innovation Survey) (variable code: numerator: inn_cis13_bas; denominator: inn_cis13_bas); OECD Innovation Indicators database, April 2025 |

[1] https://ec.europa.eu/eurostat/cache/metadata/Annexes/isoc_skslf_esms_an1.pdf

| 3.1.2 SMEs introducing business process innovations (percentage of SMEs) | |
|---|---|
| Numerator | Number of Small and medium-sized enterprises (SMEs) who introduced at least one business process innovation either new to the enterprise or new to their market. |
| Denominator | Total number of Small and medium-sized enterprises (SMEs) |
| Interpretation | Many firms innovate not by improving new products but by improving their business processes. Business process innovations include process, marketing and organisational innovation. |
| Comment | SMEs are defined as including all enterprises with 10 to 249 employees |
| Data source | Eurostat (Community Innovation Survey) (variable code: numerator: inn_cis13_spec; denominator: inn_cis13_bas); OECD Innovation Indicators database, April 2025. |

## Linkages

| 3.2.1 Innovative SMEs collaborating with others (percentage of SMEs) | |
|---|---|
| Numerator | Number of Small and medium-sized enterprises (SMEs) with innovation co-operation activities including all enterprises that had any co-operation agreements on innovation activities with other enterprises or institutions in the three years of the survey period. |
| Denominator | Total number of Small and medium-sized enterprises (SMEs) |
| Interpretation | This indicator measures the degree to which SMEs are involved in innovation co- operation. Complex innovations, in particular in ICT, often depend on the ability to draw on diverse sources of information and knowledge or to collaborate in the development of an innovation. This indicator measures the flow of knowledge between public research institutions and firms, and between firms and other firms. The indicator is limited to SMEs, because almost all large firms are involved in innovation co-operation. |
| Comment | SMEs are defined as including all enterprises with 10 to 249 employees. |
| Data source | Eurostat (Community Innovation Survey) (variable code: numerator: inn_cis13_co; denominator: inn_cis13_bas); OECD Innovation Indicators database, April 2025 |

| 3.2.2 Public-private co-publications per million population | |
|---|---|
| Numerator | Number of public-private co-authored research publications with both domestic and foreign collaborators. The definition of the "private sector" excludes the private medical and health sector |
| Denominator | Total population |
| Interpretation | This indicator captures public-private research linkages and active collaboration activities between business sector researchers and public sector researchers resulting in academic publications. |

| 3.2.2 Public-private co-publications per million population | |
|---|---|
| Data source | Scopus database. Data calculated by Science-Metrix for the European Commission (DG Research and Innovation). Population data from Eurostat (variable code: demo_pjan) |

| 3.2.3 Job-to-job mobility of Human Resources in Science & Technology | |
|---|---|
| Numerator | Job-to-job mobility of Human Resources in Science & Technology |
| Denominator | Working age population aged 25-64 |
| Interpretation | Human Resources in Science & Technology (HRST) are people who fulfil one or other of the following conditions: 1) have successfully completed a tertiary level education; 2) not formally qualified as above but employed in a S&T occupation where the above qualifications are normally required.<br><br>Job-to-job mobility in this context is defined as the movement of individuals between one job and another from one year to the next. It does not include inflows into the labour market from a situation of unemployment or inactivity.<br><br>Mobility of skilled personnel affects the degree of knowledge creation, which is one of the key drivers of innovation. |
| Data source | Eurostat (variable code: hrst_fl_mobsex) |

### Intellectual assets

| 3.3.1 PCT patent applications per billion GDP (in PPS) | |
|---|---|
| Numerator | Number of patent applications filed under the PCT, at international phase, designating the European Patent Office (EPO). Patent counts are based on the priority date, the inventor's country of residence and fractional counts. |
| Denominator | Gross Domestic Product in Purchasing Power Standard |
| Interpretation | The capacity of firms to develop new products will determine their competitive advantage. One measure of the rate of new product innovation is the number of patents. This indicator measures the number of PCT patent applications. |
| Data source | Data on patents for all countries are provided by Fraunhofer ISI as part of a contract with the European Commission, using PATSTAT; GDP data from Eurostat (variable code: nama_10_gdp) |

| 3.3.2 Trademark applications per billion GDP (in PPS) | |
|---|---|
| Numerator | Number of trademark applications applied for at EUIPO |
| Denominator | Gross Domestic Product in Purchasing Power Standard |
| Interpretation | Trademarks are an important innovation indicator, especially for the service sector. The Community trademark gives its proprietor a uniform right applicable in all Member States of the European Union through a single procedure which simplifies trademark policies at European level. It fulfils the three essential functions of a trademark: it identifies the origin of goods and |

| 3.3.2 Trademark applications per billion GDP (in PPS) | |
|---|---|
| | services, guarantees consistent quality through evidence of the company's commitment vis-à-vis the consumer, and it is a form of communication, a basis for publicity and advertising. |
| Comment | Two-year averages have been used for calculating the normalised scores for this indicator, which are used for calculating the Summary Innovation Index. |
| Data source | Trademark data from European Union Intellectual Property Office (EUIPO); GDP data from Eurostat (variable code: nama_10_gdp) |

| 3.3.3 Design applications per billion GDP (in PPS) | |
|---|---|
| Numerator | Number of individual designs applied for at the European Union Intellectual Property Office (EUIPO) |
| Denominator | Gross Domestic Product in Purchasing Power Standard |
| Interpretation | A design is the outward appearance of a product or part of it resulting from the lines, contours, colours, shape, texture, materials, and/or its ornamentation. A product can be any industrial or handicraft item including packaging, graphic symbols and typographic typefaces but excluding computer programmes. It also includes products that are composed of multiple components, which may be disassembled and reassembled. Community design protection is directly enforceable in each Member State, and it provides both the option of an unregistered and a registered Community design right for one area encompassing all Member States. |
| Comment | Two-year averages have been used for calculating the normalised scores for this indicator, which are used for calculating the Summary Innovation Index. |
| Data source | Design data from European Union Intellectual Property Office (EUIPO); GDP data from Eurostat (variable code: nama_10_gdp) |

## Employment impacts

| 4.1.1 Sales of new-to-market and new-to-enterprise innovations as percentage of turnover | |
|---|---|
| Numerator | Sum of total turnover of new or significantly improved products, either new-to-the- enterprise or new-to-the-market, for all enterprises |
| Denominator | Total turnover for all enterprises |
| Interpretation | This indicator measures the turnover of new or significantly improved products and includes both products which are only new to the enterprise and products which are also new to the market. The indicator thus captures both the creation of state-of-the-art technologies (new-to-market products) and the diffusion of these technologies (new-to-enterprise products). |
| Data source | Eurostat (Community Innovation Survey) (variable code: numerator: inn_cis13_prodt; denominator: inn_cis13_bas) |

| 4.1.2 Employment in innovative enterprises | |
|---|---|
| Numerator | Number of employed persons in innovative enterprises ('Enterprises that have either introduced an innovation or have any kind of innovation activity (including enterprises with abandoned/suspended or on-going innovation activities) |
| Denominator | Total employment for enterprises with 10 or more employees |
| Interpretation | Innovation in enterprises has a profound impact on the employability of workers, but its effect in product- and process-innovation oriented firms varies across countries. Firm innovation proves to be specifically important during a time of economic recession. Although high-skilled employees are less affected by a recession than low-skilled employees, a notable positive effect is observed for low-skilled employees in innovative firms as well. |
| Data source | Eurostat (Community Innovation Survey) (variable code: numerator: inn_cis13_bas; denominator: inn_cis13_bas) |

### Sales impacts

| 4.2.1 Exports of medium and high technology products as a share of total product exports | |
|---|---|
| Numerator | Value of medium and high-tech exports, in national currency and current prices, including exports of the following SITC Rev.3 products: 266, 267, 512, 513, 525, 533, 54, 553, 554, 562, 57, 58, 591, 593, 597, 598, 629, 653, 671, 672, 679, 71, 72, 731, 733, 737, 74, 751, 752, 759, 76, 77, 78, 79, 812, 87, 88 and 891 |
| Denominator | Value of total product exports |
| Interpretation | The indicator measures the technological competitiveness of the EU, i.e. the ability to commercialise the results of research and development (R&D) and innovation in international markets. It also reflects product specialisation by country. Creating, exploiting and commercialising new technologies are vital for the competitiveness of a country in the modern economy. Medium and high technology products are key drivers for economic growth, productivity and welfare, and are generally a source of high value added and well-paid employment. |
| Data source | Eurostat for Member States (variable code: DS-059331); UN Comtrade for non-EU countries |

| 4.2.2 Knowledge-intensive services exports as percentage of total services exports | |
|---|---|
| Numerator | Exports of knowledge-intensive services is defined as the sum of credits in EBOPS 2011 (Extended Balance of Payments Services Classification) items: SC1 (Sea transport); SC2 (Air transport); SC3A (Space transport); SF (Insurance and pension services); SG (Financial services); SH (Charges for the use of intellectual property); SI (Telecommunications, computer, and information services); SJ (Other business services); SK1 (Audio-visual and related services) |
| Denominator | Total value of services exports |
| Interpretation | The indicator measures the competitiveness of the knowledge-intensive services sector. Competitiveness-enhancing measures and innovation strategies can be mutually reinforcing for the growth of employment, export shares, and turnover at the firm level. The indicator reflects the ability of an economy, notably resulting from innovation to export services with high levels of value added, and successfully take part in knowledge-intensive global value chains. |
| Data source | UN Comtrade. |

| 4.2.3 High-tech imports from outside of the EU27 | |
|---|---|
| Numerator | High-tech (product codes: CPA_C21, CPA_C26, CPA_J59_60, CPA_J61, CPA_J62_63, CPA_M72) imports from partners outside of the EU27 |
| Denominator | Total high-tech (product codes: CPA_C21, CPA_C26, CPA_J59_60, CPA_J61, CPA_J62_63, CPA_M72) use |
| Interpretation | This indicator demonstrates how much EU Member States' domestic use of high-tech products and services is dependent on imports of high-tech products and services from outside of the EU. In other words, the indicator shows the share of high-tech products and services – used by firms, households, and the government for intermediate or final consumption or investment (gross fixed capital formation) – that is supplied by non-EU countries. |
| Data source | Eurostat (variable codes: naio_10_fcp_u1, naio_10_fcp_u2, naio_10_fcp_u3) |

### Environmental sustainability

| 4.3.1 Resource productivity | |
|---|---|
| Numerator | Gross Domestic Product (GDP) |
| Denominator | Domestic Material Consumption (DMC) in euros per kg |
| Interpretation | Resource productivity is a measure of the total amount of materials directly used by an economy (measured as domestic material consumption (DMC)) in relation to GDP. It provides insights into whether decoupling between the use of natural resources and economic growth is taking place.<br><br>Domestic material consumption (DMC) measures the total amount of materials directly used by an economy and is defined as the annual quantity |

| 4.3.1 Resource productivity | |
|---|---|
| | of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports. |
| Data source | Eurostat (variable code: env_ac_rp) |

| 4.3.2 Production-based CO2 productivity | |
|---|---|
| Numerator | GDP (US Dollars) |
| Denominator | Energy-related CO2 emissions |
| Interpretation | $CO_2$ productivity (GDP per $CO_2$ emissions) provides insights into how efficiently an economy generates value while minimising carbon emissions. This indicator can help assess progress in decarbonising economic activities, promoting energy efficiency, and transitioning to low-carbon technologies. It can support decision-making in areas such as sustainable industrial practices, investments in clean energy, and policy measures to enhance economic growth while reducing environmental impact. |
| Data source | OECD Data Explorer |

| 4.3.3 Labour productivity | |
|---|---|
| Numerator | Real GDP in chain-linked volumes |
| Denominator | Hours worked |
| Interpretation | Real labour productivity per hour worked can provide a measure of economic efficiency and innovation-driven growth. Labour productivity per hour worked (instead of per person employed) accounts for variations in working hours, ensuring better cross-country comparability. By dividing real GDP in constant prices by total hours worked, the indicator isolates true productivity gains from inflation and structural labour differences. Expressed in euros per hour worked, it reflects the real economic output generated per unit of labour. |
| Data source | Eurostat ARDECO |

# 4. Methodology for calculating composite scores

The overall performance of each country's innovation system has been summarised in a composite indicator, the Summary Innovation Index (SII). Section 4.1 provides an overview on data availability per country and per indicator. Section 4.2 explains the methodology used for calculating the SII and performance relative to the EU.

## 4.1 Data availability

The EIS uses the most recent statistics from Eurostat and other internationally recognised sources as available at the time of analysis. International sources have been used wherever possible in order to ensure comparability between countries. A detailed overview of which data sources have been used for each indicator and country is available in Annex A.

For the calculation of normalised scores, data have been used for an eight-year period. The availability of data by indicator for this eight-year period (2018-2025) covered in the EIS 2025 is shown in Table 1

Table 1. For all indicators, missing data have been imputed as explained in step 2 in Section 4.2. Country abbreviations in the column show for which countries no data are available.

For 11 indicators, full eight-year time series are not available (before imputation):

- Indicator Job-to-job mobility of Human Resources in Science & Technology has 7 years of available data (due to breaks in the time series).
- Indicator Cloud computing in enterprises has 5 years of available data.
- Indicator High speed internet access has 5 years of available data.
- For the seven indicators using CIS data, data are available for at most four individual years, as CIS data are collected once every two years (2014, 2016, 2018, 2020 and 2022), and the data collected in 2014 now falls out of the monitoring window for EIS 2025.
- Indicator Individuals who have above basic overall digital skills has 2 years of available data (due to breaks in the time series).

In addition, several indicators also include breaks in series for a limited number of countries only. In total, breaks in the data series are reported for 15 indicators counting at least one break in at least one country, including EU, neighbouring and global competitors and 12 indicators for EU27 only.

*Table 1 Data availability by indicator*

| Innovation dimension / Indicator | Most recent year for which data are available | Number of years for which data are used for the EIS | Data availability EU Member States | Data availability European neighbouring countries |
|---|---|---|---|---|
| **Human resources** | | | | |
| 1.1.1 New doctorate graduates in STEM | 2022 | 8 (2015-2022) | 100% (100%) | 100% (82%) |
| 1.1.2 Percentage population aged 25-34 having completed tertiary education | 2024 | 8 (2017-2024) | 100% (96%) | 100% (52%) |
| 1.1.3 Percentage population aged 25-64 participating in lifelong learning | 2024 | 8 (2017-2024) | 100% (84%) | 100% (46%) |
| **Attractive research systems** | | | | |
| 1.2.1 International scientific co-publications per million population | 2024 | 8 (2017-2024) | 100% (100%) | 100% (95%) |
| 1.2.2 Top 10% most cited publications | 2022 | 8 (2015-2022) | 100% (100%) | 100% (100%) |
| 1.2.3 Foreign doctorate students | 2023 | 8 (2016-2023) | 100% (94%) | 92% (74%) (BA) |
| **Digitalisation** | | | | |
| 1.3.1 High-speed internet access | 2023 | 5 (2019-2023) | 100% (100%) | 33% (33%) (AL, BA, MD, ME, MK, RS, TR, UA) |
| 1.3.2 Individuals who have above basic overall digital skills | 2023 | 2 (2021, 2023) | 100% (100%) | 75% (67%) (MD, UA, UK) |
| **Finance and support** | | | | |
| 2.1.1 R&D expenditure in the public sector | 2023 | 8 (2016-2023) | 100% (92%) | 100% (69%) |
| 2.1.2 Venture capital expenditures | 2024 | 8 (2017-2024) | 100% (100%) | 92% (89%) (AL) |
| 2.1.3 Direct government funding and government tax support for business R&D | 2022 | 8 (2015-2022) | 100% (95%) | 92% (64%) (AL) |
| **Firm investments** | | | | |

| Innovation dimension / Indicator | Most recent year for which data are available | Number of years for which data are used for the EIS | Data availability<br>EU Member States | Data availability<br>European neighbouring countries |
|---|---|---|---|---|
| 2.2.1 R&D expenditure in the business sector | 2023 | 8 (2016-2023) | 100% (94%) | 100% (66%) |
| 2.2.2 Non R&D innovation expenditure | 2022 | 4 (2016, 2018, 2020, 2022) | 96% (96%) (NL) | 92% (40%) (CH) |
| 2.2.3 Innovation expenditure per person employed | 2022 | 4 (2016, 2018, 2020, 2022) | 100% (96%) | 67% (33%) (AL, CH, UA, UK) |
| **Use of information technologies** | | | | |
| 2.3.1 Cloud computing in enterprises | 2023 | 5 (2016-2023) | 100% (89%) | 67% (42%) (CH, IS, MD, UA) |
| 2.3.2 ICT specialists | 2024 | 8 (2017-2024) | 100% (98%) | 92% (50%) (UA) |
| **Innovators** | | | | |
| 3.1.1 SMEs introducing product innovations | 2022 | 4 (2016, 2018, 2020, 2022) | 100% (96%) | 100% (58%) |
| 3.1.2 SMEs introducing business process innovations | 2022 | 4 (2016, 2018, 2020, 2022) | 100% (99%) | 100% (47%) |
| **Linkages** | | | | |
| 3.2.1 Innovative SMEs collaborating with others | 2022 | 4 (2016, 2018, 2020, 2022) | 100% (100%) | 92% (52%) (BA) |
| 3.2.2 Public-private co-publications | 2024 | 8 (2017-2024) | 100% (100%) | 100% (95%) |
| 3.2.3 Job-to-job mobility of Human resources in Science & Technology | 2020 | 8 (2013-2020) | 96% (85%) (IE) | 67% (58%) (AL, BA, MD, UA) |
| **Intellectual assets** | | | | |
| 3.3.1 PCT patent applications | 2022 | 8 (2015-2022) | 100% (100%) | 100% (100%) |
| 3.3.2 Trademark applications | 2023 | 8 (2016-2023) | 100% (100%) | 100% (92%) |
| 3.3.3 Design applications | 2023 | 8 (2016-2023) | 100% (100%) | 100% (79%) |
| **Employment impacts** | | | | |
| 4.1.1 Sales of new-to-market and new-to enterprise innovations | 2022 | 4 (2016, 2018, 2020, 2022) | 100% (96%) | 100% (52%) |

| Innovation dimension / Indicator | Most recent year for which data are available | Number of years for which data are used for the EIS | Data availability EU Member States | Data availability European neighbouring countries |
|---|---|---|---|---|
| 4.1.2 Employment in innovative enterprises | 2022 | 4 (2016, 2018, 2020, 2022) | 100% (99%) | 92% (48%) (UA) |
| **Sales impacts** | | | | |
| 4.2.1 Medium and high technology product exports | 2024 | 8 (2017-2024) | 100% (100%) | 100% (95%) |
| 4.2.2 Knowledge-intensive service exports | 2023 | 8 (2016-2023) | 100% (100%) | 100% (99%) |
| 4.2.3 High-tech imports from partners outside of the EU27 | 2022 | 8 (2015-2022) | 100% (100%) | 42% (34%) (AL, BA, IS, MD, ME, MK, UA) |
| **Environmental sustainability** | | | | |
| 4.3.1 Resource productivity | 2022 | 8 (2015-2022) | 100% (97%) | 75% (68%) (MD, ME, UA) |
| 4.3.2 Production-based CO2 productivity | 2023 | 8 (2016-2023) | 100% (100%) | 92% (90%) (MD) |
| 4.3.3 Labour productivity | 2024 | 8 (2017-2024) | 100% (100%) | 33% (31%) (AL, BA, MD, ME, MK, TR, UA, UK) |

**Note**: The figures in brackets indicate the data coverage before imputation. The countries in brackets indicate the countries for which data are missing for all years.

The availability of data after imputation of missing data by country for the eight-year period covered in the EIS 2025 is shown in Table 2. For all Member States, except Ireland and the Netherlands, data availability is 100%. For 7 neighbouring European countries, data availability is above 90%, while for 2 it is above 80% but below 90%. Data availability is relatively weak for Albania (78%), Moldova (75%) and Ukraine (69%)[2].

*Table 2 Data availability by country after imputation of missing data*

| Country code | Country | Data availability | Country code | Country | Data availability |
|---|---|---|---|---|---|
| BE | Belgium | 100% | AT | Austria | 100% |
| BG | Bulgaria | 100% | PL | Poland | 100% |

[2] The methodological revision has introduced new indicators which contributed to Ukraine falling below the threshold of 75% for inclusion in EIS. It has therefore still been included in EIS 2025.

| Country code | Country | Data availability | Country code | Country | Data availability |
|---|---|---|---|---|---|
| CZ | Czechia | 100% | PT | Portugal | 100% |
| DK | Denmark | 100% | SI | Slovenia | 100% |
| DE | Germany | 100% | SK | Slovakia | 100% |
| EE | Estonia | 100% | FI | Finland | 100% |
| IE | Ireland | 97% | SE | Sweden | 100% |
| EL | Greece | 100% | AL | Albania | 78% |
| ES | Spain | 100% | BA | Bosnia and Herzegovina | 81% |
| FR | France | 100% | IS | Iceland | 94% |
| HR | Croatia | 100% | MK | North Macedonia | 91% |
| IT | Italy | 100% | ME | Montenegro | 87% |
| CY | Cyprus | 100% | NO | Norway | 100% |
| LV | Latvia | 100% | RS | Serbia | 97% |
| LT | Lithuania | 100% | CH | Switzerland | 91% |
| LU | Luxembourg | 100% | TR | Türkiye | 94% |
| HU | Hungary | 100% | UA | Ukraine | 69% |
| MT | Malta | 100% | UK | United Kingdom | 91% |
| NL | Netherlands | 97% | MD | Moldova | 75% |
| RO | Romania | 100% | | | |

## 4.2 Calculation of the Summary Innovation Index

The overall performance of each country's innovation system has been summarised in a composite indicator, the Summary Innovation Index. The methodology used for calculating the Summary Innovation Index is explained below. “All countries” include all Member States and other European neighbouring countries included in the EIS. The methodology for calculating average innovation performance for the EU and its major global competitors is comparable to that used for calculating average innovation performance for the EU Member States but using a smaller set of countries and a smaller set of indicators.

### Step 1: Setting reference years

For each indicator, the reference year is identified as the latest year for which data availability is at least 75%. This year is then shifted to become the year 2025 in the EIS 2025. For most indicators, this reference year lags two years behind the year in which the EIS is published. In the present edition of the EIS, the data relates to the actual performance in 2024 for 8 indicators, 2023 for 10 indicators, 2022 for 13 indicators, and 2020 for 1 indicator.

## Step 2: Imputing for missing values

Reference year data are then used for the EIS publication year (2025), the next available year for the year before the EIS publication year (2024), and so on going back in time. If data for a year-in-between are not available, missing values are replaced with the value from the previous year.

If data are not available at the beginning of the time series, missing values are replaced with the next available year. The following examples clarify this step and show how 'missing' data are imputed. If data are missing for all years, no data will be imputed (the indicator will not contribute to the Summary Innovation Index).

*Table 3 Examples how to impute missing data*

| Latest year missing | 2025 | 2024 | 2023 | 2022 | 2021 |
|---|---|---|---|---|---|
| Available data | N/A | 45 | 40 | 35 | 30 |
| Use most recent year | 45 | 45 | 40 | 35 | 30 |
| | | | | | |
| Year-in-between missing | 2025 | 2024 | 2023 | 2022 | 2021 |
| Available data | 50 | N/A | 40 | 35 | 30 |
| Substitute with previous year | 50 | 40 | 40 | 35 | 30 |
| | | | | | |
| Beginning-of-period missing | 2025 | 2024 | 2023 | 2022 | 2021 |
| Available data | 50 | 45 | 40 | 35 | N/A |
| Substitute with next available year | 50 | 45 | 40 | 35 | 35 |

## Step 3: Identifying and replacing outliers

Chauvenet's Criterion in statistical theory is used to determine outliers. Positive outliers are identified as those country scores which are higher than the mean across all countries plus twice the standard deviation. Negative outliers are identified as those country scores which are smaller than the mean across all countries minus twice the standard deviation. These outliers are replaced by the respective maximum and minimum values observed over all the years and all countries excluding the identified outliers. With replacing positive (or negative) outliers, more countries can share the highest (lowest) normalised score of 1 (0). Table 4 summarises the outliers per indicator and year (negative outliers are shown in italics) for the full time series including imputed values. Years refer to the reference years in the EIS 2025.

*Table 4 Outliers by indicator*

| Innovation dimension / Indicator | Outliers (Positive / Negative) |
|---|---|
| **Human resources** | |
| 1.1.1 New doctorate graduates in STEM | CH 2018-2025; SI 2018; UK 2020-2021 |

| Innovation dimension / Indicator | Outliers (Positive / Negative) |
|---|---|
| 1.1.2 Percentage population aged 25-34 having completed tertiary education | IE 2023-2025; LU 2025; RO 2018-2025 |
| 1.1.3 Percentage population aged 25-64 participating in lifelong learning | DK 2024-2025; FI 2018-2022; SE 2018-2025 |
| **Attractive research systems** | |
| 1.2.1 International scientific co-publications per million population | CH 2019-2025; DK 2022-2025; IS 2018-2025 |
| 1.2.2 Top 10% most cited publications | |
| 1.2.3 Foreign doctorate students | LU 2018-2025; MT 2020-2025 |
| **Digitalisation** | |
| 1.3.1 High-speed internet access | AT 2018-2021; CY 2018-2021; EL 2018-2022; UK 2018-2021 |
| 1.3.2 Individuals who have above basic overall digital skills | FI 2025; NL 2018-2025 |
| **Finance and support** | |
| 2.1.1 R&D expenditure in the public sector | DK 2020-2025 |
| 2.1.2 Venture capital expenditures | EE 2022-2025; FI 2024; UK 2022-2025 |
| 2.1.3 Direct government funding and government tax support for business R&D | AT 2023; FR 2018-2025; IS 2023-2025; PT 2023-2025; UK 2018-2025 |
| **Firm investments** | |
| 2.2.1 R&D expenditure in the business sector | BE 2022-2025; SE 2019-2025 |
| 2.2.2 Non-R&D innovation expenditures | RS 2018-2024 |
| 2.2.3 Innovation expenditure per person employed | BE 2021-2025; IE 2023-2025; MT 2025; SE 2025 |
| **Use of information technologies** | |
| 2.3.1 Cloud computing in enterprises | DK 2025; FI 2022-2025; NO 2025; SE 2018-2025 |
| 2.3.2 ICT specialists | FI 2025; LU 2024-2025; SE 2018-2025; AL 2018-2023 |
| **Innovators** | |
| 3.1.1 SMEs introducing product innovations | ME 2018-2025; RS 2025; RO 2018-2020; UA 2025 |
| 3.1.2 SMEs introducing business process innovations | CY 2021-2024; EL 2023-2024; RO 2018-2025; UA 2018-2025 |
| **Linkages** | |
| 3.2.1 Innovative SMEs collaborating with others | CY 2021-2022; NO 2023-2024; SE 2025; UK 2018-2025 |

| Innovation dimension / Indicator | Outliers (Positive / Negative) |
|---|---|
| 3.2.2 Public-private co-publications | CH 2018-2025; DK 2020-2025; IS 2020-2025 |
| 3.2.3 Job-to-job mobility of Human Resources in Science & Technology | RO 2024-2025 |
| **Intellectual assets** | |
| 3.3.1 PCT patent applications | CH 2018-2024; FI 2018-2025; SE 2018-2025 |
| 3.3.2 Trademark applications | CY 2018-2025; LU 2018; MT 2018-2025 |
| 3.3.3 Design applications | AT 2018-2022; CH 2021; DK 2018-2022; LU 2018-2020; MT 2018-2019 |
| **Employment impacts** | |
| 4.1.1 Sales of new-to-market and new-to-enterprise innovations | AL 2018-2025; IE 2018-2025 |
| 4.1.2 Employment in innovative enterprises | MD 2025; RO 2018-2025 |
| **Sales impacts** | |
| 4.2.1 Medium and high technology product exports | AL 2018-2025; IS 2018-2025; NO 2019-2025 |
| 4.2.2 Knowledge-intensive services export | BA 2018-2019 |
| 4.2.3 High-tech imports from partners outside of the EU27 | IE 2022-2023; RS 2018-2025; SI 2023-2025 |
| **Environmental sustainability** | |
| 4.3.1 Resource productivity | CH 2018-2025; IT 2025; LU 2025; NL 2023-2025 |
| 4.3.2 Production-based CO2 productivity | CH 2019-2025; DK 2025; IE 2023-2025; SE 2020-2025 |
| 4.3.3 Labour productivity | IE 2021-2025; NO 2018-2025 |

### Step 4: Transforming data that have highly skewed distributions across countries

Most of the indicators are fractional indicators with values between 0% and 100%. Some indicators are unbound indicators, where values are not limited to an upper threshold. These indicators can be highly volatile and can have skewed data distributions (where most countries show low performance levels, and a few countries show exceptionally high levels of performance). For these indicators where the degree of skewness across the full eight-year period is above one, data have been transformed using a square root transformation, i.e. using the square root of the indicator value instead of the original value. For the following indicators data have been transformed: Non-R&D innovation expenditures, PCT patent applications, and Trademark applications (Table 6).

*Table 5 Skewness of the indicators before and after a possible data transformation*

| Innovation dimension / Indicator | Skewness | Skewness after transformation |
|---|---|---|
| **Human resources** | | |
| 1.1.1 New doctorate graduates in STEM | 0.377 | -- |
| 1.1.2 Percentage population aged 25-34 having completed tertiary education | 0.173 | -- |
| 1.1.3 Percentage population aged 25-64 participating in lifelong learning | 0.499 | -- |
| **Attractive research systems** | | |
| 1.2.1 International scientific co-publications per million population | 0.676 | -- |
| 1.2.2 Top 10% most cited publications | 0.084 | -- |
| 1.2.3 Foreign doctorate students | 0.59 | -- |
| **Digitalisation** | | |
| 1.3.1 High-speed internet access | -0.49 | -- |
| 1.3.2 Individuals who have above basic overall digital skills | 0.071 | -- |
| **Finance and support** | | |
| 2.1.1 R&D expenditure in the public sector | 0.104 | -- |
| 2.1.2 Venture capital expenditures | 0.983 | -- |
| 2.1.3 Direct government funding and government tax support for business R&D | 0.734 | -- |
| **Firm investments** | | |
| 2.2.1 R&D expenditure in the business sector | 0.496 | -- |
| 2.2.2 Non-R&D innovation expenditures | 2.189 | 0.684 |
| 2.2.3 Innovation expenditure per person employed | 0.675 | -- |
| **Use of information technologies** | | |
| 2.3.1 Cloud computing in enterprises | 0.56 | -- |
| 2.3.2 ICT specialists | -0.033 | -- |

| Innovation dimension / Indicator | Skewness | Skewness after transformation |
|---|---|---|
| **Innovators** | | |
| 3.1.1 SMEs introducing product innovations | -0.086 | -- |
| 3.1.2 SMEs introducing business process innovations | -0.288 | -- |
| **Linkages** | | |
| 3.2.1 Innovative SMEs collaborating with others | 0.688 | -- |
| 3.2.2 Public-private co-publications | 0.861 | -- |
| 3.2.3 Job-to-job mobility of Human Resources in Science & Technology | 0.022 | -- |
| **Intellectual assets** | | |
| 3.3.1 PCT patent applications | 1.131 | 0.548 |
| 3.3.2 Trademark applications | 1.785 | 0.595 |
| 3.3.3 Design applications | 0.517 | -- |
| **Employment impacts** | | |
| 4.1.1 Sales of new-to-market and new-to-enterprise innovations | 0.522 | -- |
| 4.1.2 Employment in innovative enterprises | -0.334 | -- |
| **Sales impacts** | | |
| 4.2.1 Medium and high technology product exports | -0.483 | -- |
| 4.2.2 Knowledge-intensive services export | 0.003 | -- |
| 4.2.3 High-tech imports from partners outside of the EU27 | 0.672 | -- |
| **Environmental sustainability** | | |
| 4.3.1 Resource productivity | 0.585 | -- |
| 4.3.2 Production-based CO2 productivity | 0.481 | -- |
| 4.3.3 Labour productivity | 0.632 | -- |

### Step 5: Determining Maximum and Minimum scores

The Maximum score is the highest score found for the eight-year period within all countries excluding positive outliers. Similarly, the Minimum score is the lowest score found for the eight-year period within all countries excluding negative outliers.

### Step 6: Calculating re-scaled scores

Re-scaled scores of the country scores (after correcting for outliers and a possible transformation of the data) for all years are calculated by first subtracting the Minimum score and then dividing by the difference between the Maximum and Minimum score. The maximum re-scaled score is thus equal to 1, and the minimum re-scaled score is equal to 0. For positive and negative outliers, the re-scaled score is equal to 1 or 0, respectively.

### Step 7: Calculating composite innovation indexes

For each year, a composite Summary Innovation Index is calculated as the unweighted average of the re-scaled scores for all indicators where all indicators receive the same weight (1/32 if data are available for all 32 indicators).

### Step 8: Calculating relative-to-EU performance scores

Performance scores relative to the EU are then calculated as the SII of the respective country divided by the SII of the EU multiplied by 100. Relative performance scores are calculated for the full eight-year period compared to the performance of the EU in 2018 and for the latest year also to that of the EU in 2025. For the definition of the performance groups, only the performance scores relative to the EU in 2025 have been used.

## 4.3 International benchmarking

The methodology for calculating the average innovation performance for the EU and its major global competitors is similar to that used for calculating the average innovation performance for the EU Member States but using a smaller set of countries and a smaller set of indicators. However, due to a different number of indicators and differences in definitions or data sources for some of the indicators, some additional manipulations are required to align the results with those of the EU in the benchmarking for the European countries.

For all global competitors and the EU, the innovation indexes are adjusted by multiplying with the ratio between the normalised scores for the EU27 calculated in the main EIS (for EU27 and neighbouring countries with 32 indicators) and the normalised score of the EU calculated for the international benchmarking (for the EU27 and international competitors with 17 indicators). This ensures that both current performance and trend results for the EU are consistent between both analyses (cf. Table 6 using the data from this year's report). The adjusted normalised scores are then used to calculate performance levels relative to the EU in 2025 for the most recent year and relative to the EU in 2018 for all years.

*Table 6 Adjustment factors used for aligning the results between the European and global benchmarking analysis*

| | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | EU Innovation Index - International benchmark | 0.531 | 0.527 | 0.525 | 0.527 | 0.534 | 0.550 | 0.550 | 0.543 |

| | | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---|---|---|---|---|---|---|---|---|---|
| 2 | EU Innovation Index - European benchmark | 0.476 | 0.478 | 0.485 | 0.500 | 0.524 | 0.532 | 0.538 | 0.536 |
| 3 | Correction applied to all global competitors and the EU calculated as the ratio of the results in row 2 and row 1 | 0.896 | 0.907 | 0.924 | 0.949 | 0.981 | 0.967 | 0.978 | 0.987 |

## 4.4 Performance group membership

For determining performance group membership, the EIS uses the following classification scheme and corresponding scores for EIS 2025:

- Innovation Leaders are all countries with a relative performance in 2025 above 125% of the EU average in 2025 (corresponding to a score of 140.883 when indexed to EU 2018).
- Strong Innovators are all countries with a relative performance in 2025 between 100% and 125% of the EU average in 2025 (corresponding to a range of scores from 112.707 to 140.883 when indexed to EU 2018).
- Moderate Innovators are all countries with a relative performance in 2025 between 70% and 100% of the EU average in 2025 (corresponding to a range of scores from 78.894 to 112.707 when indexed to EU 2018).
- Emerging Innovators are all countries with a relative performance in 2025 below 70% of the EU average in 2025 (corresponding to a score below 78.894 when indexed to EU 2018).

## 4.5 Comparability over time

It must be stressed that comparisons with results from the previous EIS reports are not possible, not even for the same years in both reports. Results for the same year, e.g. 2024 in the EIS 2024 and 2024 in this year's report, are different due to several reasons:

- The methodology revision in EIS 2025 has replaced several indicators,and moved one indicator to a different part of the index.
- By adding new data at the end of the time series for each indicator and removing data at the start of the time series, the highest and lowest data scores used for calculating normalised scores across all countries and all years for an indicator can change, directly impacting these normalised scores.
- Timeliness refers to the year for which the most recent data are available. For the EIS 2025, excluding indicators that were modified eighteen indicators have been updated with one additional year (including indicators based on the CIS survey which is run every two years and for which new data was available for four indicators) and one with two additional years compared to their availability in EIS 2024.

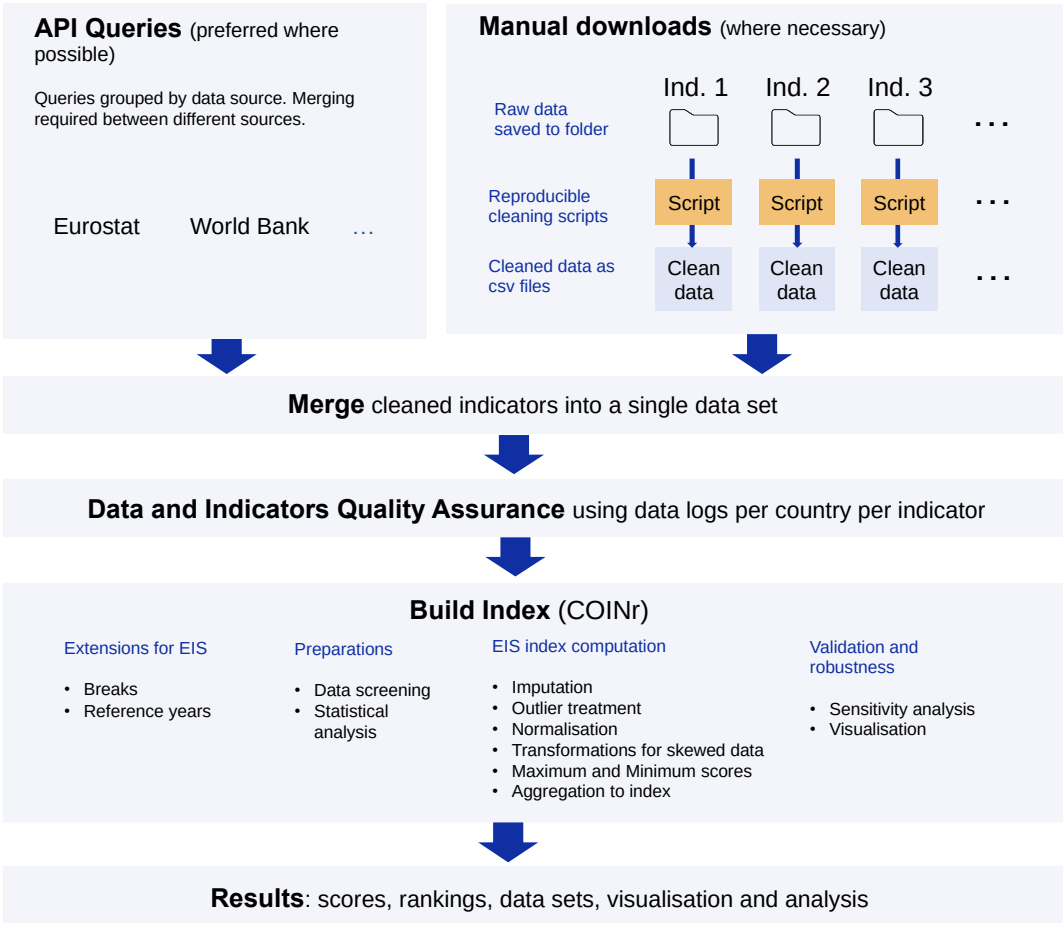
- Breaks in series for indicators and individual countries impact the most recent year used. In total, breaks in the data series are reported for 15 indicators counting at least one break in at least one country, including EU, neighbouring and global competitors and 12 indicators for EU27 only.

Consequently, one should only use the results for all years in this report to compare performance over time.

## 4.6 Automation

The data collection and calculation process for the EIS has been automated for the 2025 release. The approach is summarised in Figure 1 below.

*Figure 2 EIS automation process*




The construction of the summary index for 2025 has been performed using the COINr package[3] adapted and extended to the EIS following the 2024 methodology. COINr is an open-source R package recently developed by the European Commission's Competence

[3] See: https://bluefoxr.github.io/COINr/

Centre for Composite Indicators and Scoreboards[4], and implements international guidelines and best practices in composite indicator construction[5]. It allows highly detailed and flexible construction and analysis of composite indicators, including imputation, normalisation, outlier treatment and sensitivity analysis.

This approach provides a highly replicable and easy to follow data pipeline which feeds into the COINr package and automatically provides the main outputs of the EIS. Since the data collection, processing and outputs are largely based on code (using the R software), all code is packaged together and hosted on GitHub which also facilitates the auditing process.

To ensure the accuracy of calculations and the correct application of the methodology, the EIS results for 2024 were reproduced using the COINr package as a validation step, before calculating the updated index for 2025 using the latest data.

# 5. Structural differences between countries

## 5.1 Contextual indicators: European countries

*In response to the need for contextual analysis to better understand performance differences on the innovation indicators used in the main measurement framework, a set of contextual indicators is included in the Country profiles. The contextual indicators used in the European comparison, the years for which average performance has been calculated, and data sources used are shown in* Table 7

Table 7 . Complete definitions of all contextual indicators are also provided in this section.

*Table 7 Contextual indicators in the European Innovation Scoreboard – European countries*

| Dimension/ Indicator | Period | Source |
|---|---|---|
| **Performance and structure of the economy** | | |
| GDP per capita (PPS) | Average 2022-2024 | Eurostat |
| Average annual GDP growth (%) | Between 2022-2024 | Eurostat |
| Employment share Manufacturing (NACE C) (%) | Average 2022-2024 | Eurostat |
| of which High and Medium high tech (%) | Average 2022-2024 | Eurostat |

[4] See: https://composite-indicators.jrc.ec.europa.eu/

[5] Nardo M, Saisana M, Saltelli A, Tarantola S, Hoffmann A, Giovannini E. Handbook on Constructing Composite Indicators: Methodology and User Guide. Paris (France): OECD publishing; 2008. JRC47008. https://publications.jrc.ec.europa.eu/repository/handle/JRC47008

| Dimension/ Indicator | Period | Source |
|---|---|---|
| Employment share Services (NACE G-N) (%) | Average 2022-2024 | Eurostat |
| of which Knowledge-intensive sectors (%) | Average 2022-2024 | Eurostat |
| Turnover share SMEs (%) | Average 2018-2020 | Eurostat |
| Turnover share large companies (%) | Average 2018-2020 | Eurostat |
| Foreign-controlled entreprises - share of value added (%) | Average 2018-2020 | Eurostat |
| Herfindahl-Hirschman Index of non-EU imports of high-tech goods | 2022-2024 | Eurostat |
| **Business and entrepreneurship** | | |
| Enterprise births (10+ employees) (%) | Average 2018-2020 | Eurostat |
| Total early-stage Entrepreneurial Activity (TEA) (%) | Average 2022-2024 | Global Entrepreneurship Monitor |
| FDI net inflows (% GDP) | Average 2021-2023 | World Bank: World Development Indicators |
| Top R&D spending enterprises per 10 million population | Average 2021-2023 | EU Industrial R&D Investment Scoreboard |
| Buyer sophistication (1 to 7 best) | Average 2015-2017 | World Economic Forum |
| Digital Intensity Index | 2024 | Eurostat |
| Young High Growth Enterprises | 2022 | Eurostat |
| **Innovation profiles** | | |
| In-house product innovators with market novelties | 2020 | Eurostat, National Statistical Offices |
| In-house product innovators without market novelties | 2020 | Eurostat, National Statistical Offices |
| In-house business process innovators | 2020 | Eurostat, National Statistical Offices |
| Innovators that do not develop innovations themselves | 2020 | Eurostat, National Statistical Offices |
| Innovation active non-innovators | 2020 | Eurostat, National Statistical Offices |
| Non-innovators with potential to innovate | 2020 | Eurostat, National Statistical Offices |
| Non-innovators without disposition to innovate | 2020 | Eurostat, National Statistical Offices |

| Dimension/ Indicator | Period | Source |
|---|---|---|
| HEU funding intensity per researcher | Average 2022-2024 | CORDIS |
| **Governance** | | |
| Corruption Perceptions Index | Average 2022-2024 | Transparency International |
| Basic-school entrepreneurial education and training (1 to 5 best) | Average 2022-2024 | Global Entrepreneurship Monitor |
| Innovation procurement as a share of total public procurement | 2024 | Tenders Electronic Daily and National Public Procurement data |
| Rule of law (-2.5 to 2.5 best) | Average 2021-2023 | World Bank: Worldwide Governance Indicators |
| **Environment** | | |
| Circular material use rate | Average 2021-2023 | Eurostat |
| Greenhouse gas emissions intensity of energy consumption | Average 2018-2020 | European Environment Agency (EEA), Eurostat |
| Eco-Innovation Index | 2024 | EC, DG Environment |
| **Demography** | | |
| Population size (millions) | Average 2022-2024 | Eurostat |
| Average annual population growth (%) | Between 2022-2024 | Eurostat |
| Population density (inhabitants / km2) | Average 2022-2024 | Eurostat |

### Performance and structure of the economy

GDP per capita in purchasing power standards[6] is a measure for interpreting real income differences between countries. Higher income can increase the demand for new innovative goods and services. Economic growth is captured by the average annual growth rate of GDP for 2022-2024. In economies that grow faster, increasing demand may provide more favourable conditions for enterprises to sell their goods and services.

[6] The purchasing power standard, abbreviated as PPS, is an artificial currency unit. Theoretically, one PPS can buy the same amount of goods and services in each country. However, price differences across borders mean that different amounts of national currency units are needed for the same goods and services depending on the country. PPS are derived by dividing any economic aggregate of a country in national currency by its respective purchasing power parities. PPS is the technical term used by Eurostat for the common currency in which national accounts aggregates are expressed when adjusted for price level differences using PPPs. Thus, PPPs can be interpreted as the exchange rate of the PPS against the Euro.

Differences in economic structures are important. In particular, differences in the share of manufacturing industry in GDP, and in the so-called high-tech activities in manufacturing and services, are important factors that explain why countries can perform better or worse on indicators like business R&D expenditures, PCT patents, and innovative enterprises. Medium-high and high-tech industries have higher technological intensities than other industries. These industries, on average, will have higher R&D expenditures, more patent applications, and higher shares of innovating enterprises. Countries with above-average shares of these industries are expected to perform better on several EIS indicators. For example, for the EU on average, 85% of R&D expenditures in manufacturing are accounted for by medium-high and high-technology manufacturing industries[7][8]. Also, the share of enterprises that introduced a product and/or business process innovation is higher in medium-high and high-technology manufacturing industries compared to all core industries covered in the Community Innovation Survey[9].

Foreign ownership, including ownership from both other EU Member States and non-Member States, is important as, on average, about 30% of business R&D expenditures in EU Member States is made by foreign affiliates, which is significantly higher compared to

[7] Based on NACE Rev. 2 3-digit level, manufacturing industries can be classified into high-technology, medium-high technology, medium-low-technology, and low-technology. The high-technology and medium-high technology industries include: Chemicals and chemical products (20); Basic pharmaceutical products and pharmaceutical preparations (21); Weapons and ammunition (25.4*); Computer, electronic and optical products (26); Electrical equipment (27); Machinery and equipment not elsewhere classified (28); Motor vehicles, trailers and semi-trailers (29); Other transport equipment (30) excluding Building of ships and boats (30.1); Air and spacecraft and related machinery (30.3); and Medical and dental instruments and supplies (32.5**). If data are only available at the NACE Rev. 2 2-digit level, industries identified with an * are classified as medium-low-technology, and industries identified with an ** are classified as low-technology, and thus excluded from the high-technology and medium-high technology industries (Source: https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:High-_tech_classification_of_manufacturing_industries).

[8] Average results for 2016-2018 for 24 Member States for which data are available for at least one year. Data were extracted from Eurostat (Business enterprise R&D expenditure in high-tech sectors - NACE Rev. 2 [htec_sti_exp2].

[9] In accordance with Commission Regulation No 995/2013, the following industries and services are included in the Core target population covered in the CIS: Core Industry (excluding construction): Mining and quarrying (B), Manufacturing (C) (10-12: Manufacture of food products, beverages and tobacco; 13-15: Manufacture of textiles, wearing apparel, leather and related products; 16-18: Manufacture of wood, paper, printing and reproduction; 20: Manufacture of chemicals and chemical products; 21: Manufacture of basic pharmaceutical products and pharmaceutical preparations; 19-22 Manufacture of petroleum, chemical, pharmaceutical, rubber and plastic products; 23: Manufacture of other non-metallic mineral products; 24: Manufacture of basic metals; 25: Manufacture of fabricated metal products, except machinery and equipment; 26: Manufacture of computer, electronic and optical products; 25-30: Manufacture of fabricated metal products (except machinery and equipment), computer, electronic and optical products, electrical equipment, motor vehicles and other transport equipment; 31-33: Manufacture of furniture; jewellery, musical instruments, toys; repair and installation of machinery and equipment, Electricity, gas, steam and air conditioning supply (D), Water supply, sewerage, waste management and remediation activities (E) (36: Water collection, treatment and supply; 37-39: Sewerage, waste management, remediation activities). Core Services: Wholesale trade, except of motor vehicles and motorcycles (46), Transport and storage (H) (49-51: Land transport and transport via pipelines, water transport and air transport; 52-53: Warehousing and support activities for transportation and postal and courier activities); Information and communication (J) (58: Publishing activities; 61: Telecommunications; 62: Computer programming, consultancy and related activities; 63: Information service activities), Financial and insurance activities (K) (64: Financial service activities, except insurance and pension funding; 65: Insurance, reinsurance and pension funding, except compulsory social security; 66: Activities auxiliary to financial services and insurance activities), Professional, scientific and technical activities (M) (71-73: Architectural and engineering activities; technical testing and analysis; Scientific research and development; Advertising and market research).

Japan and the United States and comparable to Australia and Canada[10]. The share of foreign-controlled enterprises in value-added serves as a proxy for differences in the impact of foreign ownership on the economy.

### Business and entrepreneurship

Entrepreneurship is important for introducing new innovations on the market. The degree of entrepreneurship is measured by two contextual indicators measuring the share of new enterprise births in the economy and Total early-stage Entrepreneurial activity (TEA), which measures the share of the adult population aged 18–64 years who are in the process of starting a business (a nascent entrepreneur) or who started a business which is not older than 42 months at the time of the respective survey (owner-manager of a new business).

Inflows of new technologies are important as they add to a country's economic and technological capacities. Inward Foreign direct investment (FDI) can have a positive impact on innovation performance, although there are differences depending on the complexity of the receiving industry, political and economic framework conditions as well as the quality of the institutions of the receiving countries. Inward FDI flows are measured over a three-year period, as average net inflows of investments to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor.

Enterprise characteristics are important for explaining differences in R&D spending and innovation activities. Large enterprises, defined as enterprises with 250 or more employees, account for almost 80 percent of EU business R&D expenditures, whereas SMEs, defined as enterprises with 10 to 249 employees, account for only one-fifth. The presence of large R&D spending enterprises is captured by the EU Industrial R&D Investment Scoreboard, which provides economic and financial data and analysis of the top corporate R&D investors from the EU and abroad[11].

Demand is an important driver of innovation. According to the Oslo Manual (2018)[12], demand factors shape innovation activity in two major ways: for the development of new products, as firms modify and differentiate products to increase sales and market share; and for the improvement of the production and supply processes in order to reduce costs and lower prices. A robust indicator measuring the demand for innovation is currently not available. The Executive Opinion Survey of the World Economic Forum includes an indicator that provides a measure of the preferences of individual consumers for innovative products. The degree of Buyer sophistication measures, on a scale from 1 (low) to 7 (high), whether buyers focus more on price or quality of products and services.

[10] Average results for 2011-2017 for 14 Member States for which data were available (Austria, Belgium, Czechia, Finland, France, Germany, Hungary, Ireland, Italy, Netherlands, Poland, Slovenia Spain, and Sweden). Source of the data: OECD Main Science and Technology Indicators.

[11] http://iri.jrc.ec.europa.eu/scoreboard.html

[12] The Oslo Manual is the foremost international source of guidelines for the collection and use of data on innovation activities in industry. OECD/Eurostat (2018), Oslo Manual: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, OECD Publishing, Paris. DOI: https://doi.org/10.1787/9789264304604-en

## Innovation profiles

Innovation is a highly diverse activity. Enterprises can innovate through product or business process innovation, with the latter including process, marketing and organisational innovation. Enterprises can adopt new technologies developed by other enterprises or they engage in intensive in-house research and innovation activities. The capabilities needed by enterprises to innovate are very different in kind and size. More simple aggregate indicators of the percentage of 'innovative' enterprises in a particular country, as those currently used in the EIS, most likely provide information of limited value to policy makers. Instead, innovation indicators should differentiate between 'styles' or 'modes' of innovation in order to provide a clear picture of the structure of innovation capabilities within different businesses, economies, and countries (Arundel and Hollanders, 2005)[13].

Building on earlier work by academics and the OECD, Eurostat, UNU-MERIT (Maastricht University), ZEW – Leibniz Centre for European Economic Research, in collaboration with most National Statistical Offices, developed a taxonomy of innovating and non-innovating enterprises based on CIS 2016 and CIS 2018 micro data. The following characteristics were used to identify seven mutually exclusive detailed innovation profiles: the degree of newness of product innovations, own in-house capacities to innovate, and R&D activities. Of these, four innovation profiles capture different types of enterprises that have introduced an innovation (product or business process) and three innovation profiles capture non-innovators:

- In-house product innovators with market novelties, including all enterprises that introduced a product innovation that was developed by the enterprise and that was not previously offered by competitors).

- In-house product innovators without market novelties, including all enterprises that introduced a product innovation that was developed by the enterprise but that is only new to the enterprise itself.

- In-house business process innovators, including all enterprises that did not introduce a product innovation, but that did introduce a business process innovation that was developed by the enterprise.

- Innovators that do not develop innovations themselves, including all enterprises that introduced an innovation of any kind but did not develop it themselves (enterprises without significant own innovation capabilities).

- Innovation active non-innovators, including all enterprises that did not introduce any innovation but that either had ongoing or abandoned innovation activities.

- Non-innovators with potential to innovate, including all enterprises that did not introduce any innovation, and which had no ongoing or abandoned innovation activities but that did consider to innovate.

[13] https://cris.maastrichtuniversity.nl/files/64448310/Arundel_Hollanders_EXIS.pdf

- Non-innovators without disposition to innovate, including all other enterprises, those that neither introduced an innovation nor had any ongoing or abandoned innovation activities nor considered to innovate.

Data on Innovation profiles should not be interpreted as “more is better”. Instead, the data should be used to better understand differences in the composition of different types of enterprises in a country, thereby helping policy makers to design policies that better target different enterprises.

Results for the EU are shown in the table below for all enterprises. About 12% of enterprises are In-house innovators with market novelties, and about 13% of enterprises are In-house innovators without market novelties. In-house business process innovators account for 16.5% of enterprises. Innovators that do not develop innovations themselves account for 6.5% of enterprises. About 4% of enterprises are Innovation active non-innovators. Non-innovators account for almost half of EU enterprises. Non- innovators with potential to innovate account for 17% of all enterprises, and Non-innovators without disposition to innovate form the largest group accounting for 31% of all enterprises. The table below also shows which Member States have the highest and lowest share for each of the innovation profiles.

*Table 8 Distribution of enterprises and employment for seven Innovation profiles in the EU (based on CIS 2020 data)*

| | Share of enterprises | | |
|---|---|---|---|
| | EU | Highest share | Lowest share |
| In-house product innovators with market novelties | 12.2% | 24.1% (BE) | 2.2% (RO) |
| In-house product innovators without market novelties | 12.8% | 23.3% (EL) | 2.7% (LV) |
| In-house business process innovators | 16.5% | 33.4% (EE) | 2.9% (RO) |
| Innovators that do not develop innovations themselves | 6.5% | 14.0% (SI) | 0.4% (EE) |
| Innovation active non-innovators | 4.1% | 6.3% (FI) | 0.5% (RO) |
| Non-innovators with potential to innovate | 17.2% | 41.5% (ES) | 0.0% (FI) |
| Non-innovators without disposition to innovate | 30.7% | 62.4% (RO) | 12.9% (DE) |

## Governance

Institutional and legal differences between countries may make it more difficult to engage in business activities. The Corruption Perceptions Index is a composite index based on a combination of surveys and assessments of corruption from 13 different sources and scores and ranks countries based on how corrupt a country’s public sector is perceived to be, with a score of 0 representing a very high level of corruption and a score of 100 representing a very low level of corruption. The CPI is published by Transparency

International, and the data are included in the EU Sustainable Development Goals indicator set to monitor progress on SDG Goal 16 on Peace, justice and strong institutions.

Entrepreneurial skills are important for successfully transforming ideas and inventions into innovations. These skills can be acquired on the job but also by formal schooling. Basic-school entrepreneurial education and training measures the extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary levels.

Governments play an important role in enhancing the innovation capacities of an economy. Government procurement of advanced technology products measures the extent to which government procurement decisions foster technological innovation – from 1 (not at all) to 7 (extremely effectively). Trust is important for creating a business environment for undertaking risky innovative activities. The Rule of law index captures differences in the extent to which people have confidence in and abide by the rules of society. Rule of law measures differences in the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

### Environment

As the natural environment increasingly suffers from the loss of biodiversity, pollution and climate change, the relationship between innovation performance and environment sustainability grows in importance. EU level policy developments, such as the European Green Deal and the Recovery plan for Europe, underline the need to take account of the pivotal role of research and innovation in contributing to tackle societal challenges. In addition to the new innovation dimension on Environmental sustainability and the three indicators captured in this dimension, three additional indicators are included in the Contextual indicators relevant for measuring climate change and the role of innovation.

The circular material use rate measures, in percentages, the share of material recovered and fed back into the economy - thus saving extraction of primary raw materials - in overall material use. The circular material use rate is defined as the ratio of the circular use of materials (U) to the overall material use (M). It covers households, the private and the public sector. A higher circular material use rate value indicates more secondary materials substituting for primary raw materials, i.e. avoiding the environmental impacts of extracting primary material. Data for all 27 Member States and the United Kingdom are available from Eurostat.

Greenhouse gas emissions intensity of energy consumption is an indicator that is part of the EU Sustainable Development Goals (SDG) indicator set. It is used to monitor progress towards Goal 13 on climate action and SDG 7 on affordable and clean energy. The indicator is calculated as the ratio between energy related GHG emissions and gross inland consumption of energy. It expresses how many tonnes CO2 equivalents of energy related GHGs are being emitted in a certain economy per unit of energy that is being consumed. Lower scores on this indicator imply an improvement in environmental performance. Data source is the European Environment Agency (EEA) and data for all 27 Member States and other countries are available from Eurostat.

The Eco-Innovation index is a composite indicator based on 16 sub-indicators in five thematic areas: eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency outcomes and socio-economic outcomes. The overall score of an EU Member State is calculated by the unweighted mean of the 16 sub-indicators. It shows how

well individual Member States perform in eco- innovation compared to the EU average, which is equated with 100 (index EU=100). The index is part of the Eco-Innovation Scoreboard (Eco-IS)[14]. For the EIS, results from the 2024 edition of the Eco-IS are used.

### Demography

Structural data also includes population size and the average annual growth rate of population for 2022-2024. Increasing demand following an increasing population may provide more favourable conditions for enterprises to sell their goods and services. Densely populated areas are more likely to be more innovative for several reasons. Firstly, knowledge diffuses more easily when people and enterprises are located closer to each other. Secondly, in more densely populated areas there tends to be a concentration of government and educational services. Densely populated areas provide better training opportunities and employ above-average shares of highly educated people. Furthermore, the amount of natural assets per capita tends to decline with population density. This positively impacts on the share of Medium and high-tech product exports and the share of employment in knowledge intensive activities.

The remainder of this section presents the definitions of the structural indicators used for EU Member States and other European or neighbouring countries.

### Performance and structure of the economy

| GDP per capita (PPS) | |
|---|---|
| Indicator | Nominal Gross Domestic Product per capita |
| Unit | Purchasing power standard (PPS) per inhabitant |
| Calculated as | Average value for the years 2022 to 2024 |
| Data source | Eurostat: Annual national accounts data |

| Average annual GDP growth (%) | |
|---|---|
| Indicator | Gross Domestic Product at market prices |
| Unit | Chain linked volumes |
| Calculated as | Average annual growth rate between 2022 and 2024 |
| Data source | Eurostat: Annual national accounts data |

| Employment share Manufacturing (NACE C) (%) | |
|---|---|
| Numerator | Employment in Manufacturing (NACE Rev. 2 C) |
| Denominator | Total employment |

[14] hhttps://ec.europa.eu/environment/ecoap/indicators/index_en

| Employment share Manufacturing (NACE C) (%) | |
|---|---|
| Calculated as | Average percentage share for the years 2022 to 2024 |
| Data source | Eurostat: Employment in technology and knowledge-intensive sectors at the national level, by type of occupation |

| Of which High and Medium high-tech (%) | |
|---|---|
| Numerator | Total employment in the following industries:<br>- High technology: Basic pharmaceutical products and pharmaceutical preparations (NACE Rev. 2 21); Computer, electronic and optical products (NACE Rev. 2 26); Air and spacecraft and related machinery (NACE Rev. 2 30.3)<br>- Medium-high-technology: Chemicals and chemical products (NACE Rev. 2 20); Weapons and ammunition (NACE Rev. 2 25.4); Electrical equipment (NACE Rev. 2 27) ; Machinery and equipment not elsewhere classified (NACE Rev. 2 28); Motor vehicles, trailers and semi-trailers (NACE Rev. 2 29); Other transport equipment (NACE Rev. 2 30) excluding Building of ships and boats (NACE Rev. 2 30.1) and excluding Air and spacecraft and related machinery (NACE Rev. 2 30.3); Medical and dental instruments and supplies (NACE Rev. 2 32.5) |
| Denominator | Employment in Manufacturing (NACE Rev. 2 C) |
| Calculated as | Average percentage share for the years 2022 to 2024 |
| Data source | Eurostat: Employment in technology and knowledge-intensive sectors at the national level, by type of occupation |

| Employment share Services (NACE G-N) (%) | |
|---|---|
| Numerator | Employment in Services (NACE Rev. 2 G-N) |
| Denominator | Total Employment |
| Calculated as | Average percentage share for the years 2022 to 2024 |
| Data source | Eurostat: Employment in technology and knowledge-intensive sectors at the national level, by type of occupation |

| Of which Knowledge-intensive services (%) | |
|---|---|
| Numerator | Aggregate of employment in the following industries: Water transport; Air transport (NACE Rev. 2 50-51); Publishing activities; Motion picture, video and television programme production, sound recording and music publishing activities; Programming and broadcasting activities; Telecommunications; computer programming, consultancy and related activities; Information service activities (NACE Rev. 2 58-63); Financial and |

| Of which Knowledge-intensive services (%) | |
|---|---|
| | insurance activities (NACE Rev. 2 64-66); Legal and accounting activities; Activities of head offices, management consultancy activities; Architectural and engineering activities, technical testing and analysis; Scientific research and development; Advertising and market research; Other professional, scientific and technical activities; Veterinary activities (NACE Rev. 2 69-75); Employment activities (NACE Rev. 2 78); Security and investigation activities (NACE Rev. 2 80) |
| Denominator | Employment in Services (NACE Rev. 2 G-N) |
| Calculated as | Average percentage share for the years 2022 to 2024 |
| Data source | Eurostat: Employment in technology and knowledge-intensive sectors at the national level, by type of occupation |

| Turnover share SMEs (%) | |
|---|---|
| Numerator | Turnover in enterprises with 10 to 249 persons employed |
| Denominator | Turnover in Total business economy; repair of computers, personal and household goods; except financial and insurance activities |
| Calculated as | Average percentage share for the years 2018 to 2020 |
| Data source | Eurostat: Annual enterprise statistics by size class for special aggregates of activities |

| Turnover share large enterprises (%) | |
|---|---|
| Numerator | Turnover in enterprises with 250 persons employed or more |
| Denominator | Turnover in Total business economy; repair of computers, personal and household goods; except financial and insurance activities |
| Calculated as | Average percentage share for the years 2018 to 2020 |
| Data source | Eurostat: Annual enterprise statistics by size class for special aggregates of activities |

| Share of foreign controlled enterprises (%) | |
|---|---|
| Numerator | Value added by foreign-controlled enterprises at factor cost in million euros for Non-financial business economy. A foreign-controlled enterprise shall mean that the controlling institutional unit is resident in a different country from the one where the institutional unit over which it has control is resident[15] |

[15] A more detailed explanation is available at:
http://ec.europa.eu/eurostat/cache/metadata/EN/fats_esms.htm

| Share of foreign controlled enterprises (%) | |
|---|---|
| Denominator | Value added, gross. |
| Calculated as | Average percentage share for the years 2018 to 2020 |
| Data source | Eurostat: Foreign control of enterprises by economic activity and a selection of controlling countries (from 2008 onwards) [fats_g1a_08]<br>Eurostat: GDP and main components (output, expenditure, and income) [nama_10_gdp] |

| Herfindahl-Hirschman Index of non-EU imports of high-tech goods [0-1] | |
|---|---|
| Numerator | Imports of high tech products from partner (all countries except aggregates and EU27 MS) |
| Denominator | Total high tech product imports from all non EU27 partners |
| Calculated as | Sum of squared shares of all non-EU27 partners for the years 2022-2024 [16] |
| Data source | Eurostat |

## Business and entrepreneurship

| Enterprise births (10+ employees) (%) | |
|---|---|
| Numerator | Number of births of enterprises in year t |
| Size class | 10 employees or more |
| Industries | Business economy except activities of holding companies |
| Denominator | Population of active enterprises in year t |
| Calculated as | Average percentage share for the years 2018 to 2020 |
| Data source | Eurostat: Business demography data |

| Total early-stage Entrepreneurial Activity (TEA) (%) | |
|---|---|
| Indicator | Percentage of population aged 18-64 who are either a nascent entrepreneur or owner-manager of a new enterprise (less than 3.5 years old)[17] |
| Calculated as | Average for the years 2022 to 2024 |

[16] A more detailed explanation is available at: Kalanta et al (2025). European Innovation Scoreboard 2025 - Exploratory study on the linkages between innovation and resilience. European Commission (Brussels). DOI: 10.2777/0663803

[17] Total Entrepreneurial Activity (TEA) is explained in detail at http://www.gemconsortium.org/wiki/1176

| Total early-stage Entrepreneurial Activity (TEA) (%) | |
|---|---|
| Data source | Global Entrepreneurship Monitor |

| FDI net inflows (% GDP) | |
|---|---|
| Indicator | Foreign direct investment, net inflows (% of GDP) |
| Unit | Average percentage share for the years 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: BX.KLT.DINV.WD.GD.ZS |

| Top R&D spending enterprises per 10 million population | |
|---|---|
| Numerator | Number of enterprises in the top 2500 enterprises investing the largest sums in R&D in the world |
| Denominator | Population |
| Calculated as | Average number for the years 2021 to 2023 |
| Data source | European Commission (IPTS) - The EU Industrial R&D Investment Scoreboard |

| Buyer sophistication (1 to 7 best) | |
|---|---|
| Indicator | Average response to the following question: “In your country, on what basis do buyers make purchasing decisions? [1 = based solely on the lowest price; 7 = based on sophisticated performance attributes]” |
| Calculated as | Average number for the years 2015 to 2017 |
| Data source | World Economic Forum, Global Competitiveness Report |

| Digital Intensity Index | |
|---|---|
| Indicator | The Digital Intensity Index (DII) is a composite indicator that measures the degree of digitalisation in EU enterprises based on 12 variables from the EU survey on ICT usage and e-commerce in enterprises. |
| Calculated as | The indicator is calculated based on 12 variables, with each of the variables having a score of 1 point, in 2024. More information on the composition of the index can be found here: https://ec.europa.eu/eurostat/cache/metadata/Annexes/isoc_e_dii_esmsip2_an_1.pdf |
| Data source | Eurostat |

| Young High Growth Enterprises | |
|---|---|
| Numerator | Number of young high growth enterprises, measured in employment |
| Denominator | Population of active enterprises with at least 10 employees. |
| Calculated as | The indicator is based on the year 2022 |
| Data source | Eurostat |

## Innovation profiles

| In-house product innovators with market novelties | |
|---|---|
| Indicator | This group includes all enterprises that introduced a product innovation that was developed by the enterprise and that was not previously offered by competitors (‘new to the market’). |
| Calculated as | Enterprises are identified based on a combination of different questions in the CIS 2020. Full details are available in the following document: https://circabc.europa.eu/ui/group/47133480-29c1-4c23-9199-%2072a631f4fd96/library/be99ed75-c7ab-4119-804c-42867652481c |
| Data source | Eurostat and National Statistical Offices |

| In-house product innovators without market novelties | |
|---|---|
| Indicator | This group includes all enterprises that introduced a product innovation that was developed by the enterprise but that is identical or very similar to products already offered by competitors (‘only new to the enterprise itself’). |
| Calculated as | Enterprises are identified based on a combination of different questions in the CIS 2020. Full details are available in the following document: https://circabc.europa.eu/ui/group/47133480-29c1-4c23-9199-%2072a631f4fd96/library/be99ed75-c7ab-4119-804c-42867652481c |
| Data source | Eurostat and National Statistical Offices |

| In-house business process innovators | |
|---|---|
| Indicator | This group includes all enterprises that did not introduce a product innovation, but that did introduce a business process innovation that was developed by the enterprise. |
| Calculated as | Enterprises are identified based on a combination of different questions in the CIS 2020. Full details are available in the following document: https://circabc.europa.eu/ui/group/47133480-29c1-4c23-9199-%2072a631f4fd96/library/be99ed75-c7ab-4119-804c-42867652481c |
| Data source | Eurostat and National Statistical Offices |

| Innovators that do not develop innovations themselves | |
|---|---|
| Indicator | This group includes all enterprises that introduced an innovation of any kind but did not develop it themselves (enterprises without significant own innovation capabilities). |
| Calculated as | Enterprises are identified based on a combination of different questions in the CIS 2020. Full details are available in the following document: https://circabc.europa.eu/ui/group/47133480-29c1-4c23-9199-%2072a631f4fd96/library/be99ed75-c7ab-4119-804c-42867652481c |
| Data source | Eurostat and National Statistical Office |

| Innovation active non-innovators | |
|---|---|
| Indicator | This group includes all enterprises that did not introduce any innovation but that either had ongoing or abandoned innovation activities. |
| Calculated as | Enterprises are identified based on a combination of different questions in the CIS 2020. Full details are available in the following document: https://circabc.europa.eu/ui/group/47133480-29c1-4c23-9199-%2072a631f4fd96/library/be99ed75-c7ab-4119-804c-42867652481c |
| Data source | Eurostat and National Statistical Office |

| Non-innovators with potential to innovate | |
|---|---|
| Indicator | This group includes all enterprises that did not introduce any innovation, and which had no ongoing or abandoned innovation activities but that did consider to innovate. |
| Calculated as | Enterprises are identified based on a combination of different questions in the CIS 2020. Full details are available in the following document: https://circabc.europa.eu/ui/group/47133480-29c1-4c23-9199-%2072a631f4fd96/library/be99ed75-c7ab-4119-804c-42867652481c |
| Data source | Eurostat and National Statistical Office |

| Non-innovators without disposition to innovate | |
|---|---|
| Indicator | This group includes all other enterprises, those that neither introduced an innovation nor had any ongoing or abandoned innovation activities nor considered to innovate. Non-innovators without disposition to innovate |
| Calculated as | Enterprises are identified based on a combination of different questions in the CIS 2020. Full details are available in the following document: https://circabc.europa.eu/ui/group/47133480-29c1-4c23-9199-%2072a631f4fd96/library/be99ed75-c7ab-4119-804c-42867652481c |
| Data source | Eurostat and National Statistical Office |

## Governance and policy framework

| Corruption Perceptions Index (0 to 100 best) | |
|---|---|
| Indicator | Corruption Perceptions Index is a composite index based on a combination of surveys and assessments of corruption from 13 different sources and scores and ranks countries based on how corrupt a country's public sector is perceived to be, with a score of 0 representing a very high level of corruption and a score of 100 representing a very clean country. |
| Calculated as | Average for the years 2022 to 2024 |
| Data source | Eurostat SDG indicator set |

| Basic-school entrepreneurial education and training (1 to 5 best) | |
|---|---|
| Indicator | The indicator measures the extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary school levels. |
| Calculated as | Average for the years 2022 to 2024 |
| Data source | Global Entrepreneurship Monitor |

| Innovation procurement as a share of total public procurement (%) | |
|---|---|
| Numerator | Total Public Procurement of Innovative Solutions expenditure |
| Denominator | Total Public Procurement expenditure |
| Calculated as | Share of total public procurement in 2024 |
| Data source | Tenders Electronic Daily and National Public Procurement data |

| Rule of law (-2.5 to 2.5 best) | |
|---|---|
| Indicator | Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. |
| Calculated as | Average for the years 2021 to 2023 |
| Data source | Worldwide Governance Indicators |

## Climate change

| Circular material use rate | |
|---|---|
| Indicator | The circular material use is defined as the ratio of the circular use of materials to the overall material use. IT measures the share of material recovered and fed back into the economy - thus saving extraction of primary raw materials - in overall material use.<br>The overall material use is measured by summing up the aggregate domestic material consumption (DMC) and the circular use of materials. DMC is defined in economy-wide material flow accounts.<br>The circular use of materials is approximated by the amount of waste recycled in domestic recovery plants minus imported waste destined for recovery plus exported waste destined for recovery abroad.<br>Waste recycled in domestic recovery plants comprises the recovery operations R2 to R11 - as defined in the Waste Framework Directive 75/442/EEC. The imports and exports of waste destined for recycling - i.e. the amount of imported and exported waste bound for recovery – are approximated from the European statistics on international trade in goods.<br>A higher circularity rate value indicates means that more secondary materials substitute for primary raw materials thus reducing the environmental impacts of extracting primary material.<br>(https://ec.europa.eu/eurostat/web/products-datasets/-/cei_srm030) |
| Calculated as | Average for the years 2021 to 2023 |
| Data source | Eurostat |

| Greenhouse gas emissions intensity of energy consumption | |
|---|---|
| Indicator | The indicator is part of the EU Sustainable Development Goals (SDG) indicator set. It is used to monitor progress towards Goal 13 on climate action and SDG 7 on affordable and clean energy.<br><br>SDG 13 aims to implement the commitment to the United Nations Framework Convention on Climate Change and operationalise the Green Climate Fund. It aims to strengthen countries' resilience and adaptive capacity to climate-related hazards and natural disasters by integrating climate change mitigation and adaptation measures into national strategies, policies and planning. SDG 7 calls for ensuring universal access to modern energy services, improving energy efficiency and increasing the share of renewable energy. |
| Calculated as | The indicator is calculated as the ratio between energy related GHG emissions and gross inland consumption of energy. It expresses how many tonnes CO2 equivalents of energy related GHGs are being emitted in a certain economy per unit of energy that is being consumed. The data on energy emissions are being sourced from the GHG emissions reported to the UNFCCC.<br><br>Average for the years 2018 to 2020 |
| Data source | European Environment Agency (EEA), Eurostat |

| Eco-Innovation Index | |
|---|---|
| Indicator | The Eco-Innovation Index shows how well individual Member States perform in eco-innovation compared to the EU average, which is equated with 100 (index EU=100). The index complements other measurement approaches of innovativeness of EU countries and aims to promote a holistic view on economic, environmental and social performance. |
| Calculated as | The indicator is based on 16 sub-indicators from eight contributors in five thematic areas: eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency outcomes and socio-economic outcomes. The overall score of an EU Member State is calculated by the unweighted mean of the 16 sub- indicators. |
| Data source | European Commission: 2024 Eco-Innovation Scoreboard https://ec.europa.eu/environment/ecoap/indicators/index_en |

### Demography

| Population size | |
|---|---|
| Indicator | Population on 1 January |
| Calculated as | Average value for the years 2022 to 2024 |
| Data source | Eurostat: Population data |

| Average annual population growth (%) | |
|---|---|
| Indicator | Population on 1 January |
| Calculated as | Average value for the years 2022 to 2024 |
| Data source | Eurostat: Population data |

| Population density | |
|---|---|
| Indicator | Inhabitants per km2 |
| Calculated as | Average value for the years 2022 to 2024 |
| Data source | Eurostat |

## 5.2 Contextual indicators: Global economic competitors

For international benchmarking, a comparable list of contextual indicators has been used from various data sources. The list of contextual indicators used in the international

comparison, the years for which average performance has been calculated, and the data sources used are shown in Table 9.

*Table 9 Contextual indicators in the international comparison – Global competitors*

| Contextual indicator | Period | Source |
|---|---|---|
| **Performance and structure of the economy** | | |
| GDP per capita, PPP (international dollars) | Average 2021-2023 | World Bank - World Development Indicators |
| Average annual GDP growth (%) | Average 2021-2023 | World Bank - World Development Indicators |
| Employment share in Agriculture (%) | Average 2021-2023 | World Bank - World Development Indicators |
| Employment share in Industry (%) | Average 2021-2023 | World Bank - World Development Indicators |
| Employment share in Services (%) | Average 2021-2023 | World Bank - World Development Indicators |
| Employment in Knowledge-intensive services (% of total employment) | Average 2021-2023 | Eurostat |
| **Business and entrepreneurship** | | |
| Total early-stage Entrepreneurial Activity (TEA) (%) | Average 2021-2023 | Global Entrepreneurship Monitor |
| FDI net inflows (% GDP) | Average 2021-2023 | World Development Indicators |
| Top R&D spending enterprises per 10 million population | Average 2022-2024 | EU Industrial R&D Investment Scoreboard |
| Top R&D spending enterprises, average R&D spending, million Euros | Average 2022-2024 | EU Industrial R&D Investment Scoreboard |
| Number of Unicorns | January 2025 | CBS Insights: https://www.cbinsights.com/research-unicorn-companies |
| Buyer sophistication (1 to 7 best) | Average 2015-2017 | World Economic Forum |
| **Governance and policy framework** | | |
| Corruption perception index | Average 2022-2024 | Transparency International |

| Contextual indicator | Period | Source |
|---|---|---|
| Basic-school entrepreneurial education and training (1 to 5 best) | Average 2022-2024 | Global Entrepreneurship Monitor |
| Government procurement of advanced technology products (1 to 7 best) | Average 2015-2017 | World Economic Forum |
| Rule of law (-2.5 to 2.5 best) | Average 2020-2022 | World Bank - Worldwide Governance Indicators |
| **Demography** | | |
| Population size (millions) | Average 2021-2023 | World Bank - World Development Indicators |
| Average annual population growth (%) | Average 2021-2023 | World Bank - World Development Indicators |
| Population density (inhabitants / km2) | Average 2020-2022 | World Bank - World Development Indicators |

## Performance and structure of the economy

| GDP per capita (PPP) | |
|---|---|
| Indicator | GDP per capita, PPP (current international $) |
| Calculated as | Average value for the years 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: NY.GDP.PCAP.PP.CD |

| Average annual GDP growth (%) | |
|---|---|
| Indicator | GDP per capita (constant 2011 US$) |
| Calculated as | Average annual growth rate between 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: NY.GDP.MKTP.KD |

| Employment share in Agriculture (%) | |
|---|---|
| Indicator | Employment in agriculture (% of total employment) |
| Calculated as | Average percentage share for the years 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: SL.AGR.EMPL.ZS |

| Employment share in Industry (%) | |
|---|---|
| Indicator | Employment in industry (% of total employment) |
| Calculated as | Average percentage share for the years 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: SL.IND.EMPL.ZS |

| Employment share in Services (%) | |
|---|---|
| Indicator | Employment in services (% of total employment) |
| Calculated as | Average percentage share for the years 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: SL.SRV.EMPL.ZS |

| Employment share Knowledge-intensive services (%) | |
|---|---|
| Indicator | Employment in Knowledge-intensive services (% of total employment) |
| Calculated as | Average percentage share for the years 2021 to 2023 |

| Employment share Knowledge-intensive services (%) | |
|---|---|
| Data source | Eurostat |

## Business and entrepreneurship

| Total early-stage Entrepreneurial Activity (TEA) (%) | |
|---|---|
| Indicator | Percentage of population aged 18-64 who are either a nascent entrepreneur or owner-manager of a new enterprise (less than 3.5 years old)[18] |
| Calculated as | Average for the years 2021 to 2023 |
| Data source | Global Entrepreneurship Monitor |

| FDI net inflows (% GDP) | |
|---|---|
| Indicator | Foreign direct investment, net inflows (% of GDP) |
| Calculated as | Average percentage share for the years 2021 to 2023 |
| Data source | World Bank (World Development Indicators) – Series name: BX.KLT.DINV.WD.GD.ZS |

| Top R&D spending enterprises per 10 million population | |
|---|---|
| Indicator | Number of enterprises in the top 2500 enterprises investing the largest sums in R&D in the world |
| Data source | European Commission (IPTS) - The EU Industrial R&D Investment Scoreboard |
| Calculated as | Average number for the years 2022 to 2024 |
| Denominator | Population |
| Data source | World Bank: World Development Indicators |

| Top R&D spending enterprises, average R&D spending, million Euros | |
|---|---|
| Indicator | Average R&D spending per enterprise listed in the top 2500 enterprises investing the largest sums in R&D in the world |
| Calculated as | Average number for the years 2022 to 2024 |
| Data source | European Commission (IPTS) - The EU Industrial R&D Investment Scoreboard |

[18] Total Entrepreneurial Activity (TEA) is explained in detail at http://www.gemconsortium.org/wiki/1176

| Number of Unicorns | |
|---|---|
| Indicator | A unicorn is a private start-up company which, over time, has been valued at $1 billion or more |
| Calculated as | Total number of Unicorns listed January 2025 |
| Data source | CB Insights: https://www.cbinsights.com/research-unicorn-companies |

| Buyer sophistication (1 to 7 best) | |
|---|---|
| Indicator | Average response to the following question: “In your country, on what basis do buyers make purchasing decisions? [1 = based solely on the lowest price; 7 = based on sophisticated performance attributes]” |
| Calculated as | Average number for the years 2015 to 2017 |
| Data source | World Economic Forum, Global Competitiveness Report |

### Governance and policy framework

| Corruption Perceptions Index (0 to 100 best) | |
|---|---|
| Indicator | Corruption Perceptions Index is a composite index based on a combination of surveys and assessments of corruption from 13 different sources and scores and ranks countries based on how corrupt a country’s public sector is perceived to be, with a score of 0 representing a very high level of corruption and a score of 100 representing a very clean country. |
| Calculated as | Average for the years 2022 to 2024 |
| Data source | Transparency International |

| Basic-school entrepreneurial education and training (1 to 5 best) | |
|---|---|
| Indicator | The indicator measures the extent to which training in creating or managing SMEs is incorporated within the education and training system at primary and secondary school levels. |
| Calculated as | Average for the years 2022 to 2024 |
| Data source | Global Entrepreneurship Monitor |

| Government procurement of advanced technology products (1 to 7 best) | |
|---|---|
| Indicator | The indicator measures the extent to which government procurement decisions in a country foster technological innovation by providing the average response to the following question: “Government purchase decisions for the procurement of advanced technology products are (1 = based solely on price, 7 = based on technical performance and innovativeness)” |
| Calculated as | Average for the years 2015 to 2017 |

| Government procurement of advanced technology products (1 to 7 best) | |
|---|---|
| Data source | World Economic Forum |

| Rule of law (-2.5 to 2.5 best) | |
|---|---|
| Indicator | Rule of law captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. |
| Calculated as | Average for the years 2020 to 2022 |
| Data source | World Bank: Worldwide Governance Indicators |

## Demography

| Population size | |
|---|---|
| Indicator | Population on 1 January |
| Unit | Average value for the years 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: SP.POP.TOTL |

| Average annual population growth (%) | |
|---|---|
| Indicator | Population on 1 January |
| Calculated as | Average annual growth rate between 2021 to 2023 |
| Data source | World Bank (World Development Indicators) - Series name: SP.POP.TOTL |

| Population density | |
|---|---|
| Indicator | Population density (people per sq. km of land area) |
| Calculated as | Average value for the years 2020 to 2022 |
| Data source | World Bank (World Development Indicators) - Series name: EN.POP.DNST |

# Annex A Manual for extracting and compiling EIS data

This Annex describes how raw data have been collected for each indicator.

For data from Eurostat, the variable names are added between [ ]. These can be used in the search box on Eurostat's website (https://ec.europa.eu/eurostat/web/main/home) to access the data.

Data from the OECD are available at: https://data-explorer.oecd.org/

Data on exports from UN Comtrade are available at: https://comtradeplus.un.org/

Data from the World Bank are available at: https://databank.worldbank.org/

### 1.1.1 New doctorate graduates in science, technology, engineering and mathematics (STEM) per 1000 population aged 25-34

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Graduates at doctoral level, in science, math., computing, engineering, manufacturing, construction, by sex - per 1000 of population aged 25-34 [educ_uoe_grad07]:
    - SEX: Total
    - UNIT: Per thousand inhabitants
- Data are available for 2013-2022.

Data for non-EU countries is calculated from the OECD indicators ['OECD STEM GRAD'] and ['OECD Population']. Data are available for 2010-2022.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2015-2024.

Data for Montenegro have been made available by Statistical Office of Montenegro. Data are available for 2016-2023.

Data for Bosnia and Herzegovina, and Ukraine was taken from the EIS 2024.

### 1.1.2 Percentage population aged 25-34 having completed tertiary education

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Population by educational attainment level, sex and age (%) - main indicators [edat_lfse_03]:
    - AGE: From 25 to 34 years
    - ISCED11: Tertiary education (levels 5-8)
    - SEX: Total
    - UNIT: Percentage
- Data are available for 2002-2024.
- For all EU Member States and other European countries for which data are available for 2021, these data are flagged by Eurostat as a break in time series. None of the data before 2021 is used and all values for the years before 2021 are replaced by the value for 2021.

Data for non-EU countries is taken from OECD indicator ['OECD % TEREDUC'] and data are available for 2008-2022.

Data for Albania have been made available by the Institute of Statistics of Albania (INSTAT). Data are available for 2014-2024.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2015-2022.

Data for Ukraine have been made available by the State Statistics Service for Ukraine. Data are available for 2021.

### 1.1.3 Percentage population aged 25-64 participating in lifelong learning

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Participation rate in education and training (last 4 weeks) by sex and age [trng_lfs_01]:
  - AGE: From 25 to 64 years
  - SEX: Total
  - UNIT: Percentage
- Data are available for 2004-2024.
- For all EU Member States and other European countries for which data are available for 2021, these data are flagged by Eurostat as a break in time series. None of the data before 2021 is used and all values for the years before 2021 are replaced by the value for 2021.

Data for Albania have been made available by the Institute of Statistics of Albania (INSTAT). Data are available for 2023 and 2024.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2015-2022.

Data for Ukraine have been made available by the State Statistics Service for Ukraine. Data are available for 2021.

### 1.2.1 International scientific co-publications per million population

Data on number of international scientific co-publications for all countries are calculated and made available by Science-Metrix for the years 2010-2024. Data have been calculated using full counting and have been extracted from.

Population data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Population on 1 January by age and sex [demo_pjan]:
  - AGE: Total
  - SEX: Total
  - UNIT: Number

Population data for all years for Bosnia and Herzegovina and from 2021 onwards for the United Kingdom are extracted from the World Development Indicators of the World Bank:

- Dataset: Population, total – SP.POP.TOTL

The indicator is calculated by dividing the number of international scientific co-publications by the population size in millions.

Data are available for 2010-2023.

### 1.2.2 Scientific publications among the top-10% most cited publications worldwide as percentage of total scientific publications of the country

Data on the percentage share of publications among the top 10% most cited publications for all countries are calculated and made available by Science-Metrix for the years 2010-2024. Data have been calculated using fractional counting and have been extracted from Scopus.

### 1.2.3 Foreign doctorate students as a percentage of all doctorate students.

Data for EU Member States and other European countries are extracted from Eurostat:

- For the numerator, the following data are extracted:

  Dataset: Mobile students from abroad enrolled by education level, sex and field of education [educ_uoe_mobs01]:

  - ISCED11: Doctoral or equivalent level
  - ISCEDF13: Total
  - Sex: Total
  - Unit: Number

- For the denominator, the following data are extracted:

Dataset: Pupils and students enrolled by education level, sex and field of education [educ_uoe_enra03]:

  - ISCED11: Doctoral or equivalent level
  - ISCEDF13: Total
  - Sex: Total
  - Unit: Number

- The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
- Data are available for 2013-2023.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2015-2024.

Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2017-2023.

Data for Montenegro was taken directly from EIS 2024.

Data are not available for Bosnia and Herzegovina.

### 1.3.1 High-speed internet access

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: High-speed internet coverage, by type of area [sdg_17_60]:
  - TERRTYPO: Total
- Data are available for 2019-2023.

Data are not available for Bosnia and Herzegovina, Montenegro, Moldova, North Macedonia, Albania, Serbia, Türkiye, and Ukraine.

### 1.3.2 Individuals who have above basic overall digital skills (share of population)

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Individuals' level of digital skills (from 2021 onwards) [isoc_sk_dskl_i21]:
  - IND_TYPE: All Individuals
  - INDIC_IS: Individuals with above basic overall digital skills (all five component indicators are at above basic level)
  - UNIT: Percentage of individuals
- Data are available for 2021 and 2023.
- Note that data used from the same data source (Individuals' level of digital skills [isoc_sk_dskl_i] (until 2019)) up to the year 2019 for previous versions of the EIS are no longer comparable to the data currently available from 2021 onwards. On average the difference between the new time series starting in 2021 and the previous time series ending in 2019 is a ratio of one-third between the new 2021 values and the 2019 values.

Data are not available for Moldova, Ukraine and United Kingdom.

### 2.1.1 R&D expenditure in the public sector (percentage of GDP)

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Gross domestic expenditure on R&D (GERD) by sector of performance [rd_e_gerdtot]:
  - For the government sector:
    - SECTPERF: Government sector
    - UNIT: Percentage of gross domestic product (GDP)
  - For the higher education sector:
    - SECTPERF: Higher education sector
    - UNIT: Percentage of gross domestic product (GDP)
- The indicator is calculated as the sum of the share of R&D expenditure by the government as a percentage of GDP and of the share of R&D expenditure by the higher education sector as a percentage of GDP.
- Data are available for 2010-2023.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2015-2023.

Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2021-2022.

### 2.1.2 Venture capital expenditures (percentage of GDP)

Data on venture capital expenditures for EU Member States and other European countries are collected from Invest Europe / EDC and Eurostat:

- Invest Europe / EDC has made available data on ‘Equity investments according to the country of the portfolio company’ (Table 27). Data for the numerator are calculated as the difference between ‘Total equity investment’ and ‘Buyout’.
- Data are available for 2009-2024.

Data on Gross Domestic Product for most EU Member States and other European countries are extracted from Eurostat:

- Dataset: GDP and main components (output, expenditure and income) [nama_10_gdp]:
  - NA_ITEM: Gross domestic product at market prices
  - UNIT: Current prices, million euro

Data on Gross Domestic Product from 2020 onwards for the United Kingdom are extracted from the World Bank Development Indicators of the World Bank:

- Dataset: GDP, PPP (current international $) NY.GDP.MKTP.CD
  - GDP (current US$)
  - GDP (current LCU)
- Data are converted into Euros using the Euro-US$ exchange rate calculated by using the same data in current US$ and current LCU for one of the Eurozone countries

For all countries, venture capital expenditures as a share of GDP is then calculated as venture capital expenditures divided by GDP multiplied by 100.

The indicator is calculated as a three-year unweighted average:

- 2017 as the unweighted average of the percentage shares for 2015-2017
- 2018 as the unweighted average of the percentage shares for 2016-2018
- 2019 as the unweighted average of the percentage shares for 2017-2019
- 2020 as the unweighted average of the percentage shares for 2018-2020
- 2021 as the unweighted average of the percentage shares for 2019-2021
- 2022 as the unweighted average of the percentage shares for 2020-2022
- 2023 as the unweighted average of the percentage shares for 2021-2023
- 2023 as the unweighted average of the percentage shares for 2022-2024

Data are not available for Albania.

### 2.1.3 Direct government funding and government tax support for business R&D (percentage of GDP)

Data for EU Member States and other European countries are collected from the OECD:

- Source: OECD R&D Tax Incentives Database. R&D tax expenditure and direct government funding of BERD. Last consulted in May 2025.
  - Measure: Government budget allocations for R&D (GBARD) and Government-financed BERD.
  - Unit of measure: Percentage of GDP.

- The indicator is calculated as the sum of the government budget allocations for R&D (GBARD) as a percentage of GDP and of the government-financed BERD as a percentage of GDP.
- Data are available for 2010-2022.

Data for Bosnia and Herzegovina, North Macedonia, Montenegro and Serbia are collected from Eurostat:

- Dataset: GERD by sector of performance and source of funds [rd_e_gerdfund]:
  - SECTFUND: Government sector
  - SECTPERF: Business enterprise sector
  - UNIT: Percentage of gross domestic product (GDP)
- Data are available for 2010-2023.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2017-2018.

Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2021.

Data are not available for Albania.

### 2.2.1 R&D expenditure in the business sector (percentage of GDP)

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Gross domestic expenditure on R&D (GERD) by sector of performance [rd_e_gerdtot]:
  - SECTPERF: Business enterprises sector
  - UNIT: Percentage of gross domestic product (GDP)
- Data are available for 2010-2023.

Data for non-EU countries is taken from the OECD and data are available for 2010-2022.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2015-2023.

Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2021-2023.

### 2.2.2 Non-R&D innovation expenditures (percentage of turnover)

Data for EU Member States and other European countries are extracted from Eurostat:

- Data from the Community Innovation Survey CIS 2022 for 2022:
  - Numerator: Enterprises and expenditure of enterprises on innovation activities by area of expenditure, NACE Rev. 2 activity and size class [inn_cis13_exp]:
    - EXPEND: Expenditure on innovation (excluding R&D)
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro

- Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis13_bas]:
  - ENTERPR: Total
  - INDIC_INN: Net turnover in 2020
  - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
  - SIZECLAS: Total
  - UNIT: Thousand euro
- The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
- The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2020 for 2020:
  - Numerator: Enterprises and expenditure of enterprises on innovation activities by area of expenditure, NACE Rev. 2 activity and size class [inn_cis12_exp]:
    - EXPEND: Expenditure on innovation (excluding R&D)
    - INDIC_INN: Expenditure in 2020
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis12_bas]:
    - ENTERPR: Total
    - INDIC_INN: Turnover in 2020
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
  - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2018 for 2018:
  - Numerator: Expenditures of enterprises by area of expenditure, NACE Rev. 2 activity and size class [inn_cis11_exp]:
    - ENTERPR: Total
    - EXPEND: Expenditure on innovation (excluding R&D)
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro

- Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]:
  - ENTERPR: Total
  - INDIC_INN: Turnover in 2018
  - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
  - SIZECLAS: Total
  - UNIT: Thousand euro
- The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
- The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2016 for 2016:
  - Numerator: Expenditures in product and/or process innovative enterprises by area of expenditure, NACE Rev. 2 activity and size class [inn_cis10_exp]:
    - EXPEND: Expenditure on innovation (excluding R&D); Acquisition of machinery, equipment and software; Acquisition of other external knowledge
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro

    The numerator is calculated as the sum of the expenditure on innovation, the acquisition of machinery, equipment and software, and the acquisition of other external knowledge.
  - Denominator: Basic economic information on the enterprises by NACE Rev. 2 activity and size class [inn_cis10_bas]:
    - ENTERPR: Total
    - INDIC_INN: Turnover in 2016
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
  - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

In addition, the following data have been used/extracted:

- Data for Albania have been made available by the Institute of Statistics of Albania (INSTAT). Data are available for 2018-2020.
- Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2016-2022.

- Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2020 and 2022.
- Data for the United Kingdom have been made available by the Department for Business & Trade of the United Kingdom. Data are available for 2020.
- Data for Bosnia and Herzegovina and Montenegro were taken directly from the EIS 2024.

### 2.2.3 Innovation expenditure per person employed

Data for EU Member States and other European countries are extracted from Eurostat:

- Data from the Community Innovation Survey CIS 2020 for 2020:
  - Numerator: Enterprises and expenditure of enterprises on innovation activities by area of expenditure, NACE Rev. 2 activity and size class [inn_cis13_exp]:
    - EXPEND: Expenditure on innovation (including R&D)
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis13_bas]:
    - ENTERPR: Total
    - INDIC_INN: Employees
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Number
  - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
  - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.
- Data from the Community Innovation Survey CIS 2020 for 2020:
  - Numerator: Enterprises and expenditure of enterprises on innovation activities by area of expenditure, NACE Rev. 2 activity and size class [inn_cis12_exp]:
    - EXPEND: Expenditure on innovation (including R&D)
    - INDIC_INN: Expenditure in 2020
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis12_bas]:
    - ENTERPR: Total
    - INDIC_INN: Employed persons in 2020
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total

        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2018 for 2018:
    - Numerator: Expenditures of enterprises by area of expenditure, NACE Rev. 2 activity and size class [inn_cis11_exp]:
    - ENTERPR: Total
        - EXPEND: Expenditure on innovation (including R&D)
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: Total
        - UNIT: Thousand euro
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]:
        - ENTERPR: Total
        - INDIC_INN: Employed persons in 2018
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: Total
        - UNIT: Number
    - Purchasing Power Standards (PPPs): GDP and main components (output, expenditure and income) [nama_10_gdp]:
        - NA_ITEM: Gross domestic product at market prices
        - UNIT: Current prices, million purchasing power standards (PPS, EU27 from 2020); Current prices, million euro

      PPPs are calculated as the ratio between Current prices, million purchasing power standards (PPS, EU27 from 2020) and Current prices, million euro.
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by the value for PPP.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2016 for 2016:
    - Numerator: Expenditures in product and/or process innovative enterprises by area of expenditure, NACE Rev. 2 activity and size class [inn_cis10_exp]:
        - EXPEND: Expenditure on innovation (including R&D)
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: Total
        - UNIT: Thousand euro

- Denominator: Basic economic information on the enterprises by NACE Rev. 2 activity and size class [inn_cis10_bas]:
  - ENTERPR: Total
  - INDIC_INN: Employees in 2016
  - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
  - SIZECLAS: Total
  - UNIT: Number
- Purchasing Power Standards (PPPs): GDP and main components (output, expenditure and income) [nama_10_gdp]:
  - NA_ITEM: Gross domestic product at market prices
  - UNIT: Current prices, million purchasing power standards (PPS, EU27 from 2020); Current prices, million euro

  PPPs are calculated as the ratio between Current prices, million purchasing power standards (PPS, EU27 from 2020) and Current prices, million euro.
- The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by the value for PPP.
- The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

In addition, the following data have been used/extracted:

- Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2016-2022.
- Data for Serbia have been made available by the Statistical Office of the Republic of Serbia. Data are available for 2022.
- Data for Bosnia and Herzegovina and Montenegro were taken from EIS 2024.

Data are not available for Albania, Switzerland and Ukraine.

### 2.3.1 Cloud computing in enterprises

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Cloud computing services by size class of enterprise [isoc_cicce_use]:
  - NACE_R2: All activities (except agriculture, forestry and fishing, and mining and quarrying), without financial sector
  - SIZE_EMP: 10 persons employed or more
  - UNIT: Percentage of Enterprises
  - INDIC_IS: Buy cloud computing services used over the internet
- Data are available for 2014-2024.

Data are not available for Switzerland, Moldova and Ukraine.

### 2.3.2 ICT specialists (percentage of total employment)

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Employed ICT specialists - total [isoc_sks_itspt]:
    - UNIT: Percentage of total employment
- Data are available for 2004-2024.

Data for non-EU countries is taken from the OECD and UNECE. Data are available for 2010-2022 for OECD and 2010-2024 for UNECE.

Data for Albania have been made available by the Institute of Statistics of Albania (INSTAT). Data are available for 2018-2024.

Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2015-2022.

Data are not available for Ukraine.

### 3.1.1 SMEs introducing product innovation (percentage of SMEs)

Data for EU Member States and other European countries are extracted from Eurostat:

- Data from the Community Innovation Survey CIS 2022 for 2022:
    - Numerator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class (inn_cis13_bas). Sum of the following 2 data extractions:
        - ENTERPR: Product innovative enterprises (regardless of any other type of innovation)
        - INDIC_INN: Enterprises
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Product innovative enterprises (regardless of any other type of innovation)
        - INDIC_INN: Enterprises
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class (inn_cis12_bas). Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Enterprises
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total

        - INDIC_INN: Enterprises
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2020 for 2020:
    - Numerator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class (inn_cis12_bas). Sum of the following 2 data extractions:
        - ENTERPR: Product innovative enterprises (regardless of any other type of innovation)
        - INDIC_INN: Enterprises in the population in 2020
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Product innovative enterprises (regardless of any other type of innovation)
        - INDIC_INN: Enterprises in the population in 2020
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class (inn_cis12_bas). Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Enterprises in the population in 2020
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Enterprises in the population in 2020
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number

- The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
- The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2018 for 2018:
  - Numerator: Product innovative enterprises that have introduced at least one new or significantly improved product by type of innovation, NACE Rev. 2 activity and size class [inn_cis11_prodn]. Sum of the following 2 data extractions:
    - INNOVAT: Product innovation
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 10 to 49 employees
    - UNIT: Number

    - INNOVAT: Product innovation
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 50 to 249 employees
    - UNIT: Number
  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]. Sum of the following 2 data extractions:
    - ENTERPR: Total
    - INDIC_INN: Number of enterprises in the population in 2018
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 10 to 49 employees
    - UNIT: Number

    - ENTERPR: Total
    - INDIC_INN: Number of enterprises in the population in 2018
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 50 to 249 employees
    - UNIT: Number
  - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
  - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2016 for 2016:
  - Numerator: Enterprises by NACE Rev. 2 activity and size class [inn_cis10_type]. Sum of the following 4 data extractions:

- ENTERPR: Product innovative enterprises only
- NACE_R2: Innovation core activities (Com.Reg. 995/2012)
- SIZECLAS: From 10 to 49 employees
- UNIT: Number

- ENTERPR: Product innovative enterprises only
- NACE_R2: Innovation core activities (Com.Reg. 995/2012)
- SIZECLAS: From 50 to 249 employees
- UNIT: Number

- ENTERPR: Product and process innovative enterprises only
- NACE_R2: Innovation core activities (Com.Reg. 995/2012)
- SIZECLAS: From 10 to 49 employees
- UNIT: Number

- ENTERPR: Product and process innovative enterprises only
- NACE_R2: Innovation core activities (Com.Reg. 995/2012)
- SIZECLAS: From 50 to 249 employees
- UNIT: Number

◦ Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis10_bas]. Sum of the following 4 data extractions:

- ENTERPR: Innovative enterprises
- INDIC_INN: Number of enterprises in the population in 2016
- NACE_R2: Innovation core activities (Com.Reg. 995/2012)
- SIZECLAS: From 10 to 49 employees
- UNIT: Number

- ENTERPR: Innovative enterprises
- INDIC_INN: Number of enterprises in the population in 2016
- NACE_R2: Innovation core activities (Com.Reg. 995/2012)
- SIZECLAS: From 50 to 249 employees
- UNIT: Number

- ENTERPR: Non innovative enterprises
- INDIC_INN: Number of enterprises in the population in 2016
- NACE_R2: Innovation core activities (Com.Reg. 995/2012)
- SIZECLAS: From 10 to 49 employees

        - UNIT: Number

        - ENTERPR: Non innovative enterprises
        - INDIC_INN: Number of enterprises in the population in 2016
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

In addition, the following data have been used/extracted:

- Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2016-2022.
- Data for Albania have been made available by the Institute of Statistics of Albania (INSTAT). Data are available for 2020 and 2022.
- Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2020 and 2022.
- Data for Bosnia and Herzegovina and Montenegro were taken from EIS 2024.

### 3.1.2 SMEs introducing business process innovations (percentage of SMEs)

Data for EU Member States and other European countries are extracted from Eurostat:

- Data from the Community Innovation Survey CIS 2022 for 2022:
    - Numerator: Enterprises that introduced new or improved processes by type of innovation, NACE Rev. 2 activity and size class [inn_cis13_spec]. Sum of the following 2 data extractions:
        - INNOVAT: Business process innovation
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - INNOVAT: Business process innovation
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by innovation status, NACE Rev. 2 activity and size class (inn_cis13_bas). Sum of the following 2 data extractions:
        - ENTERPR: Total

        - INDIC_INN: Enterprises
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Enterprises
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2020 for 2020:
    - Numerator: Enterprises that introduced new or improved processes by type of innovation, NACE Rev. 2 activity and size class [inn_cis12_spec]. Sum of the following 2 data extractions:
        - INNOVAT: Business process innovation
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - INNOVAT: Business process innovation
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class (inn_cis12_bas). Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Enterprises in the population in 2020
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Enterprises in the population in 2020

        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2018 for 2018:
    - Numerator: Enterprises that introduced new or improved processes by type of innovation, NACE Rev. 2 activity and size class [inn_cis11_spec]. Sum of the following 2 data extractions:
        - INNOVAT: Business process innovation
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - INNOVAT: Business process innovation
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Number of enterprises in the population in 2018
        - NACE_R2 : Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Number of enterprises in the population in 2018
        - NACE_R2 : Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

The concept of business process innovators was introduced in the CIS 2018 following the recommendations in the latest 2018 edition of the Oslo annual. Earlier versions of the CIS survey did not provide results for business process innovators. Results for the CIS 2016 have been copied from the EIS 2021 database.

In addition, the following data have been used/extracted:

- Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2016-2022.
- Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2018-2020.
- Data for Albania have been made available by the Institute of Statistics of Albania (INSTAT). Data are available for 2020 and 2022.
- Data for Bosnia and Herzegovina and Montenegro were taken from EIS 2024.

### 3.2.1 Innovative SMEs collaborating with others (percentage of SMEs)

Data for EU Member States and other European countries are extracted from Eurostat:

- Data from the Community Innovation Survey CIS 2022 for 2022:
  - Numerator: Enterprises that co-operated on business activities with other enterprises or organisations by field of activities, NACE Rev. 2 activity and size class [inn_cis13_co]. Sum of the following 2 data extractions:
    - ENTERPR: Innovation active enterprises
    - INN_ACT: Research and development (R&D) or other innovation activities
    - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 10 to 49 employees
    - UNIT: Number

    - ENTERPR: Innovation active enterprises
    - INN_ACT: Research and development (R&D) or other innovation activities
    - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 50 to 249 employees
    - UNIT: Number
  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis13_bas]. Sum of the following 2 data extractions:
    - ENTERPR: Total
    - INDIC_INN: Enterprises
    - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 10 to 49 employees
    - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Enterprises
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2020 for 2020:
    - Numerator: Enterprises that co-operated on business activities with other enterprises or organisations by field of activities, NACE Rev. 2 activity and size class [inn_cis12_co]. Sum of the following 2 data extractions:
        - ENTERPR: Innovation active enterprises
        - INN_ACT: Research and development (R&D) or other innovation activities
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Innovation active enterprises
        - INN_ACT: Research and development (R&D) or other innovation activities
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis12_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Enterprises in the population in 2020
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Enterprises in the population in 2020
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees

        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2018 for 2018:
    - Numerator: Enterprises that co-operated on business activities with other enterprises or organisations by field of activities, NACE Rev. 2 activity and size class [inn_cis11_co]. Sum of the following 2 data extractions:
        - ENTERPR: Innovation active enterprises
        - INN_ACT: Research and development (R&D) or other innovation activities
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Innovation active enterprises
        - INN_ACT: Research and development (R&D) or other innovation activities
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Number of enterprises in the population in 2018
        - NACE_R2 : Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Number of enterprises in the population in 2018
        - NACE_R2 : Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2016 for 2016:
  - Numerator: Product and/or process innovative enterprises engaged in co-operation by cooperation partner, NACE Rev. 2 activity and size class [inn_cis10_coop]. Sum of the following 2 data extractions:
    - COOP_PTN: Total
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 10 to 49 employees
    - UNIT: Number

    - COOP_PTN: Total
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 50 to 249 employees
    - UNIT: Number
  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]. Sum of the following 2 data extractions:
    - ENTERPR: Total
    - INDIC_INN: Number of enterprises in the population in 2016
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 10 to 49 employees
    - UNIT: Number

    - ENTERPR: Total
    - INDIC_INN: Number of enterprises in the population in 2016
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: From 50 to 249 employees
    - UNIT: Number
  - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
  - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

In addition, the following data have been used/extracted:

- Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2016-2022.
- Data for Ukraine have been made available by the State Statistics Service of Ukraine. Data are available for 2020 and 2022.
- Data for the United Kingdom have been made available by the Department for Business & Trade of the United Kingdom. Data are available for 2020.

- Data for Albania and Montenegro was taken from EIS 2024.

Data are not available for Bosnia and Herzegovina.

### 3.2.2 Public-private publications per million population

Data on number of public-private co-publications for all countries are calculated and made available by Science-Metrix for the years 2010-2024. Data have been calculated using full counting and have been extracted from Scopus.

Population data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Population on 1 January by age and sex [demo_pjan]:
  - AGE: Total
  - SEX: Total
  - UNIT: Number

Population data for all years for Bosnia and Herzegovina and from 2021 onwards for the United Kingdom are extracted from the World Development Indicators of the World Bank:

- Dataset: Population, total – SP.POP.TOTL

The indicator is calculated by dividing the number of public-private co-publications by the population size in millions.

Data are available for 2010-2023.

### 3.2.3 Job-to-job mobility of Human Resources in Science & Technology

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Job-to-job mobility of HRST by sex [hrst_fl_mobsex]:
  - AGE: From 25 to 64 years
  - SEX: Total
  - UNIT: Percentage
- Data are available for 2010-2020

Data are not available for Albania, Bosnia and Herzegovina, Ireland, Moldova, and Ukraine.

### 3.3.1 PCT patent applications per billion GDP (in PPS)

Data on patents for all countries are provided by DG RTD (2025), extracted by Fraunhofer using PATSTAT:

- Dataset: Patents by technology
  - Patents Office & Patents Families: Patent applications filed under the PCT
  - Reference country: Inventor(s)'s country(ies) of residence
  - Reference date: Priority date
  - Technology domains & IPC: Total Patents
- Data are available for 2010-2022.

Data on Gross Domestic Product (GDP) in Purchasing Power Standards (PPS) for EU Member States and other European countries are extracted from Eurostat:

- Dataset: GDP and main components (output, expenditure and income) [nama_10_gdp]:
    - NA_ITEM: Gross domestic product at market prices
    - UNIT Current prices, million purchasing power standards (PPS, EU27 from 2020)

Data on Gross Domestic Product (GDP) for countries not covered by Eurostat are extracted from the World Bank Development Indicators:

- Dataset: GDP, PPP (current international $) NY.GDP.MKTP.PP.CD
- Data are converted into PPPs by dividing the GDP in PPPs for one of the Eurozone countries with the ratio of GDP, PPP (current international $) for one of the Eurozone countries and GDP, PPP (current international $) for the respective country.

The indicator is calculated by dividing the number of PCT patent applications by GDP in PPPs.

### 3.3.2 Trademark applications per billion GDP (in PPS)

Data on trademark applications for all countries are extracted from the individual “Statistics per country or territory” reports from the European Union Intellectual Property Office (EUIPO). Data can be copied from each of the reports in pdf format:

- Table: EUTMs Received by Year
- Data are available for 2010-2023.

Data on Gross Domestic Product (GDP) for countries not covered by Eurostat are extracted from the World Bank Development Indicators:

- Dataset: GDP, PPP (current international $) NY.GDP.MKTP.PP.CD
- Data are converted into PPPs by dividing the GDP in PPPs for one of the Eurozone countries with the ratio of GDP, PPP (current international $) for one of the Eurozone countries and GDP, PPP (current international $) for the respective country.

The indicator is calculated by dividing the number of trademark applications by GDP in PPPs.

For all countries, the indicator is calculated for each country as a 2-year rolling average. The indicator is calculated for each country as a 2-year rolling average. Prior to calculation of the rolling average, missing values are imputed (replacing with the last available value first, then the next available value).

### 3.3.3 Design applications per billion GDP (in PPS)

Data on individual design applications for all countries are extracted from the individual “Statistics per country or territory” reports from the European Union Intellectual Property Office (EUIPO). Data can be copied from each of the reports in pdf format:

- Table: RCDs Received by Year
- Data are available for 2010-2023.

Data on Gross Domestic Product (GDP) for countries not covered by Eurostat are extracted from the World Bank Development Indicators:

- Dataset: GDP, PPP (current international $) NY.GDP.MKTP.PP.CD
- Data are converted into PPPs by dividing the GDP in PPPs for one of the Eurozone countries with the ratio of GDP, PPP (current international $) for one of the Eurozone countries and GDP, PPP (current international $) for the respective country.

The indicator is calculated by dividing the number of design trademark applications by GDP in PPPs.

For all countries, the indicator is calculated for each country as a 2-year rolling average. The indicator is calculated for each country as a 2-year rolling average. Prior to calculation of the rolling average, missing values are imputed (replacing with the last available value first, then the next available value).

#### 4.1.1 Sales of new-to-market and new-to-enterprise innovations as a percentage of turnover

Data for EU Member States and other European countries are extracted from Eurostat:

- Data from the Community Innovation Survey CIS 2022 for 2022:
  - Numerator: Turnover of enterprises from new or significantly improved products, by NACE Rev.2 activity and size class [inn_cis13_prodt]. Sum of the following 2 data extractions:
    - INNOVAT: New or significantly improved products that were new to the firm
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro

    - INNOVAT: New or significantly improved products that were new to the market
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro

  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis13_bas]:
    - ENTERPR: Total
    - INDIC_INN: Net turnover
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
  - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.
- Data from the Community Innovation Survey CIS 2020 for 2020:
  - Numerator: Turnover of enterprises from new or significantly improved products, by NACE Rev.2 activity and size class [inn_cis12_prodt]:
    - INNOVAT: New or significantly improved products
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro

- Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis12_bas]:
  - ENTERPR: Total
  - INDIC_INN: Turnover in 2020
  - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
  - SIZECLAS: Total
  - UNIT: Thousand euro
- The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
- The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2018 for 2018:
  - Numerator: Turnover of enterprises from new or significantly improved products, by NACE Rev.2 activity and size class [inn_cis11_prodt]:
    - INNOVAT: New or significantly improved products
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]:
    - ENTERPR: Total
    - INDIC_INN: Turnover in 2018
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro
  - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
  - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2016 for 2016:
  - Numerator: Turnover of enterprises from new or significantly improved products, by NACE Rev.2 activity and size class [inn_cis10_prodt]. Sum of the following 2 data extractions:
    - INNOVAT: New or significantly improved products that were new to the firm
    - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
    - SIZECLAS: Total
    - UNIT: Thousand euro

        - INNOVAT: New or significantly improved products that were new to the market
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: Total
        - UNIT: Thousand euro
    - Denominator: Basic economic information on the enterprises by NACE Rev. 2 activity and size class [inn_cis10_bas]:
        - ENTERPR: Total
        - INDIC_INN: Turnover in 2016
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: Total
        - UNIT: Thousand euro
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

In addition, the following data have been used/extracted:

- Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2016-2022.
- Data for the United Kingdom have been made available by the Department for Business & Trade of the United Kingdom. Data are available for 2020.
- Data for Albania, Bosnia and Herzegovina, Montenegro, and Ukraine were taken directly from EIS 2024.

#### 4.1.2 Employment in innovative enterprises

Data for EU Member States and other European countries are extracted from Eurostat:

- Data from the Community Innovation Survey CIS 2022 for 2022:
    - Numerator: Enterprises, employed persons and turnover by innovation status, NACE Rev. 2 activity and size class [inn_cis12_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Innovation active enterprises
        - INDIC_INN: Employees
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Innovation active enterprises
        - INDIC_INN: Employees
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)

        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis12_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Employees
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Employees
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.
- Data from the Community Innovation Survey CIS 2020 for 2020:
    - Numerator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis12_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Innovative enterprises
        - INDIC_INN: Employed persons in 2020
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Innovative enterprises
        - INDIC_INN: Employed persons in 2020
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis12_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Employed persons in 2020

        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Employed persons in 2020
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2018 for 2018:
    - Numerator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Innovative enterprises
        - INDIC_INN: Employed persons in 2018
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Innovative enterprises
        - INDIC_INN: Employed persons in 2018
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Enterprises, employed persons and turnover by type of enterprise, NACE Rev. 2 activity and size class [inn_cis11_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Employed persons in 2018
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total

        - INDIC_INN: Employed persons in 2018
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.
    - The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

- Data from the Community Innovation Survey CIS 2016 for 2016:
    - Numerator: Basic economic information on the enterprises by NACE Rev. 2 activity and size class [inn_cis10_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Innovative enterprises
        - INDIC_INN: Number of employees in 2016
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Innovative enterprises
        - INDIC_INN: Number of employees in 2016
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - Denominator: Basic economic information on the enterprises by NACE Rev. 2 activity and size class [inn_cis10_bas]. Sum of the following 2 data extractions:
        - ENTERPR: Total
        - INDIC_INN: Number of employees in 2016
        - NACE_R2 Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 10 to 49 employees
        - UNIT: Number

        - ENTERPR: Total
        - INDIC_INN: Number of employees in 2016
        - NACE_R2: Innovation core activities (Com.Reg. 995/2012)
        - SIZECLAS: From 50 to 249 employees
        - UNIT: Number
    - The indicator is calculated by dividing the data for the numerator by the data for the denominator and multiplying by 100.

- The EU aggregate is calculated using only data for those Member States for which both numerator and denominator data are available.

In addition, the following data have been used/extracted:

- Data for Moldova have been made available by the National Bureau of Statistics of the Republic of Moldova. Data are available for 2016-2022.
- Data for Albania have been made available by the Institute of Statistics of Albania (INSTAT). Data are available for 2022.
- Data for the United Kingdom have been made available by the Department for Business & Trade of the United Kingdom. Data are available for 2020.
- Data for Bosnia and Herzegovina and Montenegro were taken from EIS 2024.

Data are not available for Ukraine.

### 4.2.1 Exports of medium and high technology products as a share of total products exports

Medium and high technology products have been defined to include the following Standard International Trade Classification, Rev. 4 items:

- 266 Synthetic fibres suitable for spinning
- 267 Other man-made fibres suitable for spinning; waste of man-made fibres
- 512 Alcohols, phenols, phenol-alcohols, and their halogenated, sulphonated, nitrated or nitrosated derivatives
- 513 Carboxylic acids and their anhydrides, halides, peroxides and peroxyacids; their halogenated, sulphonated, nitrated or nitrosated derivatives
- 525 Radioactive and associated materials
- 533 Pigments, paints, varnishes and related materials
- 54 Medicinal and pharmaceutical products
- 553 Perfumery, cosmetic or toilet preparations (excluding soaps)
- 554 Soap, cleansing and polishing preparations
- 562 Fertilizers (other than those of group 272)
- 57 Plastics in primary forms
- 58 Plastics in non-primary forms
- 591 Insecticides, rodenticides, fungicides, herbicides, anti-sprouting products and plant-growth regulators, disinfectants and similar products, put up in forms or packings for retail sale or as preparations or articles (e.g., sulphur-treated bands, wicks and candles, and fly-papers)
- 593 Explosives and pyrotechnic products
- 597 Prepared additives for mineral oils and the like; prepared liquids for hydraulic transmission; anti-freezing preparations and prepared de-icing fluids; lubricating preparations
- 598 Miscellaneous chemical products, n.e.s.
- 629 Articles of rubber, n.e.s.
- 653 Fabrics, woven, of man-made textile materials (not including narrow or special fabrics)

- 671 Pig-iron, spiegeleisen, sponge iron, iron or steel granules and powders and ferro-alloys
- 672 Ingots and other primary forms of iron or steel; semi-finished products of iron or steel
- 679 Tubes, pipes and hollow profiles, and tube or pipe fittings, of iron or steel
- 71 Power-generating machinery and equipment
- 72 Machinery specialized for particular industries
- 731 Machine tools working by removing metal or other material
- 733 Machine tools for working metal, sintered metal carbides or cermets, without removing material
- 737 Metalworking machinery (other than machine tools) and parts thereof, n.e.s.
- 74 General industrial machinery and equipment, n.e.s., and machine parts, n.e.s.
- 75 Office machines and automatic data-processing machines
- 76 Telecommunications and sound-recording and reproducing apparatus and equipment
- 77 Electrical machinery, apparatus and appliances, n.e.s., and electrical parts thereof (including nonelectrical counterparts, n.e.s., of electrical household-type equipment)
- 78 Road vehicles (including air-cushion vehicles)
- 79 Other transport equipment
- 812 Sanitary, plumbing and heating fixtures and fittings, n.e.s.
- 87 Professional, scientific and controlling instruments and apparatus, n.e.s
- 88 Photographic apparatus, equipment and supplies and optical goods, n.e.s.; watches and clocks
- 891 Arms and ammunition

Data for EU Member States and the United Kingdom are extracted from Eurostat:

- Dataset: EU trade since 1999 by SITC [DS-059331]:
    - Data for the numerator are calculated as:
        - INDICATORS: VALUE_IN_EUROS
        - FLOW: EXPORT
        - FREQ: Annual
        - PARTNER: All countries of the world
        - PRODUCT: 266 + 267 + 512 + 513 + 525 + 533 + 54 + 553 + 554 + 562 + 57 + 58 + 591 + 593 + 597 + 598 + 629 + 653 + 671 + 672 + 679 + 71 + 72 + 731 + 733 + 737 + 74 + 751 + 752 + 759 + 76 + 77 + 78 + 79 + 812 + 87 + 88 + 891
    - Data for the denominator are calculated as:
        - INDICATORS: VALUE_IN_EUROS
        - FLOW: EXPORT
        - FREQ: Annual
        - PARTNER: All countries of the world

        - PRODUCT: Total
- The indicator is calculated as the ratio between the numerator and denominator multiplied by 100.
- Data are available for 2010-2024.

Data for other European countries are extracted from the United Nations Comtrade database (https://comtrade.un.org/).

- Data for the numerator are calculated as the sum of the Trade Value (US$) in SITC Rev. 4 exports for the following commodities: 266 + 267 + 512 + 513 + 525 + 533 + 54 + 553 + 554 + 562 + 57 + 58 + 591 + 593 + 597 + 598 + 629 + 653 + 671 + 672 + 679 + 71 + 72 + 731 + 733 + 737 + 74 + 751 + 752 + 759 + 76 + 77 + 78 + 79 + 812 + 87 + 88 + 891
- Data for the denominator are equal to the Trade Value (US$) of total exports.
- The indicator is calculated as the ratio of the numerator by the denominator multiplied by 100.
- Data are available for 2013-2024.

#### 4.2.2 Knowledge-intensive services exports as a share of total services exports

Knowledge-intensive services exports have been defined to include the following EBOPS 2011 (Extended Balance of Payments Services Classification) items:

- SC1 Sea transport
- SC2 Air transport
- SC3A Space transport
- SF Insurance and pension services
- SG Financial services
- SH Charges for the use of intellectual property
- SI Telecommunications, computer, and services
- SJ Other business services
- SK1 Audio-visual and related services

Data for most EU Member States are extracted from Eurostat:

- Dataset: International trade in services (since 2011) (BPM6) [bop_its6_det]:
    - Data for the numerator are calculated as:
        - BOP_ITEM: SC1 + SC2 + SC3A + SF + SG + SH + SI + SJ + SK1
        - CURRENCY: Million euro
        - PARTNER: Rest of the world
        - STK_FLOW: Credit
    - Data for the denominator are calculated as the sum of:
        - BOP_ITEM: All
        - CURRENCY: Million euro

        - PARTNER: Rest of the world
        - STK_FLOW: Credit
- The indicator is calculated as the ratio of the numerator by the denominator multiplied by 100.
- Data are available for 2010-2023.

Data for other European countries are extracted from the data centre of UN Trade and Development (UNCTAD) (https://unctadstat.unctad.org/datacentre/):

- Dataset: Services (BPM6): Exports and imports by service-category, trade-partner World, annual
- Data are equal to the share of the above listed categories in total exports, in US dollars at current prices.
- Data are available for 2010-2023.

#### 4.2.3 High-tech imports from outside of the EU27

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: EU inter-country use table at basic prices [naio_10_fcp_u1, naio_10_fcp_u2, naio_10_fcp_u3]:
    - Data for the numerator are calculated as the sum of:
        - PRD_AVA: CPA_C21, CPA_C26, CPA_J59_60, CPA_J61, CPA_J62_63, CPA_M72
        - C_ORIG: all countries except Domestic (DOM)
        - C_DEST: all 27 EU Member States + UK, NO, CH, TR
    - Data for the numerator are calculated as the sum of:
        - PRD_AVA: CPA_C21, CPA_C26, CPA_J59_60, CPA_J61, CPA_J62_63, CPA_M72
        - C_ORIG: non-EU27 countries
        - C_DEST: all 27 EU Member States + UK, NO, CH, TR
- Data are available for 2010-2022.

#### 4.3.1 Resource productivity

Data for EU Member States and other European countries are extracted from Eurostat:

- Dataset: Resource productivity [env_ac_rp]:
    - UNIT: Purchasing power standard (PPS) per kilogram
- Data are available for 2000-2022.

Data for the United Kingdom were taken from EIS 2025.

Data are not available for Switzerland, Moldova, Montenegro and Ukraine.

### 4.3.2 Production-based CO2 productivity

Data for EU Member States and other European countries are manually extracted from the OECD Data Explorer:

- The following filters were used:
    - Frequency of observation & Time period: Annual from 2011
    - Reference area: EU27 + neighbouring countries
    - Measure: Production-based CO2 productivity, GDP per unit of energy-related CO2 emissions
- Data is available for 2011-2023

Data is not available for Moldova

### 4.3.3 Labour productivity

Data are manually extracted from the Eurostat ARDECO database, filtered for code SOVGDH.

Data are not available for Bosnia and Herzegovina, Albania, Montenegro, Türkiye, Switzerland, Iceland, Moldova, North Macedonia, Ukraine and United Kingdom

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The European Innovation Scoreboard (EIS) offers an annual comparative analysis of research and innovation performance across EU Member States, identifying the relative strengths and weaknesses of national innovation systems. It supports policymakers in pinpointing priority areas to enhance innovation capacity. Since its first publication in 2001, the EIS has undergone several methodological updates, with the most recent revision introduced in the 2025 edition. This methodology report outlines the revised measurement framework, alongside an explanation of the Summary Innovation Index methodology, and contextual indicator definitions used in country profiles. All related data and results are publicly accessible through the EIS 2025 database.

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