

# Research and development

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2 Metadata update	
2.1 Date of last update	15.03.2023
3 Statistical presentation	
3.1 Data description	
<p>The data provide users with information on R&amp;D expenditure and R&amp;D personnel broken down by institutional sector: business enterprise sector (BES), government sector (GOV), higher education sector (HES), private non-profit sector (PNP). These sectors are defined on the basis of the ESA Classification of Institutional Sectors 2010, except that a separate higher education sector has been created. All data are broken down by these sectors of R&amp;D performance.</p> <p>The R&amp;D expenditure is further broken down by source of funds, by type of costs, by economic activity (SKNACE Rev.2), by size class, by type of R&amp;D, by fields of science, by socio-economic objectives and by regions (NUTS 2 and NUTS3 levels). Besides R&amp;D expenditure in basic unit National currency the following units are available: Percentage of GDP, Euro per inhabitant, Purchasing Power Standard.</p> <p>R&amp;D personnel data are available in full-time equivalent (FTE), in head count (HC), as a % of employment and as a % of labour force. The data are further broken down by occupation, by qualification, by gender, by size class, by citizenship, by age groups, by fields of science) and by regions (NUTS 2 and NUTS3 levels). In 2016, there was a change in methodology. Until 2015, data on employed persons include only internal R&amp;D employees and doctoral students, while from 2016 onwards include also unpaid working proprietors and R&amp;D family members as well as external contract workers. Another change is from 2018, the number in head counts represents <b>total number</b> of persons engaged in R&amp;D <b>during the year</b>, while before number at a given date as of December 31.</p> <p>The presented information is the result of processing of the annual statistical survey on research and development VV 6-01. The survey methodology is in line with international standards - Frascati Manual 2015 (FM2015).</p>	
3.2 Classification system	
R&D statistics are compiled in line with international statistical classifications:	

- Institutional sector classification ESA 2010
- Statistical Classification of Economic Activities in the European Community (SK NACE Rev.2)
- Statistical classification of products by activity - CPA 2015
- International Standard Classification of Occupations (ISCO-08)
- International Standard Classification of Education (ISCED 2011)
- Fields of Research and Development classification (FORD, OECD)
- Nomenclature for the analysis and comparison of scientific programmes and budgets (NABS 2007)
- Classification of Statistical Territorial Units (NUTS).

### 3.3 Sector coverage

R&D statistics covers all economic sectors and all size groups of R&D organizations and workplaces. They are:

- Independent VV organizations, ie. legal and physical entities whose principal activity is research and development (according to the Statistical Classification of Economic Activities (SK NACE Rev.2);
- Associated R&D workplaces, i.e. legal and physical entities whose principal activity is other than R&D, but their research and development potential in FTE is at least one man-year.

### 3.4 Statistical concepts and definitions

Main concepts and definitions used for the production of R&D statistics are given by the Frascati Manual which contains international standard methodology for R&D statistics.

**Research and experimental development (R&D)** comprise creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge. (§ 2.2. FM 2015).

**Intramural R&D expenditures** are all expenditures for R&D performed within a statistical unit or sector of the economy during a specific period, whatever the source of funds.

**R&D personnel** include all persons employed directly in R&D as well as persons providing direct services such as R&D managers, administrators and administrative staff. Persons providing indirect and ancillary services, such as canteen, maintenance, administrative and security staff, are excluded, although their wages and salaries are included in 'other current costs' when measuring R&D expenditure.

R&D personnel are divided into internal and external staff. Internal staff includes employees of the reporting unit and in the business and private non-profit sectors also working proprietors and unpaid family workers participating in R & D activities. External staff includes persons engaged in R&D according to out-of-work contracts, including consultants and hired persons, outside workers who have worked or assisted in R & D and have not received any wages or remuneration, and PhD students (who are not employees) participating in R&D activities.

Depending on their occupation, R&D personnel are divided into the following groups: researchers, technicians and equivalent staff, supporting staff.

**Researchers** are professionals engaged in the conception or creation of new knowledge. They conduct research and improve or develop concepts, theories, models, techniques instrumentation, software or operational methods.

**Technicians and equivalent staff** are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physical and life sciences, or social sciences, humanities and the arts. They participate in R&D by performing scientific and technical tasks involving the application of concepts, operational methods and use of research equipment, normally under the supervision of researchers. Other supporting staff includes skilled and unskilled

craftsmen, and administrative, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

**Other supporting staff** includes skilled and unskilled craftsmen, and administrative, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

### 3.5 Statistical unit

The statistical units used in order to compile R&D statistics are:

- enterprises for the statistics compiled at national level
- local units for the statistics compiled at regional level. The definitions of the statistical units ("enterprise" and "local unit") are as set out in Council Regulation (EEC) No 696/93 of 15 March 1993 on the statistical units for the observation and analysis of the production system in the Community.

### 3.6 Statistical population

R&D statistics are compiled for R&D activities performed in the whole economy. R&D data relate to the population of all R&D performing units classified in Sections A to U of the Statistical Classification of Economic Activities in the European Community (SKNACE Rev.2).

### 3.7 Reference area

R&D statistics are available in total for the Slovak Republic and in breakdown by 8 regions (NUTS3 level).

### 3.8 Time coverage

The SO SR database contains data on research and development since 1994.

### 3.9 Base period

Not applicable.

## 4 Unit of measure

Data on research and development expenditures in the database of the Statistical Office of the Slovak Republic are available in thous. EUR. Data for basic indicators are also expressed as: percentage of GDP, Mill. PPS, share per capita, share per person employed in research and development.

## 5 Reference period

Reference period is the calendar year.

## 6 Institutional mandate

### 6.1 Legal acts and other agreements

The Statistical Office of the Slovak Republic collects information on research and development in the statistical survey **VV 6-01 on research and development** which is included in the Program of State Statistical Surveys, published for three years in the Collection of Laws of the SR. The reporting obligation to submit statistical questionnaires by entities arises from the Act No. 540/2001

Coll. on State Statistics, as amended (Article 18 (3)) and it cannot be refused (Article 18 (8)). The Statistical Office of the Slovak Republic is responsible for the protection of confidential data obtained and guarantees its use solely for statistical purposes.

## 6.2 Data sharing

Statistical information from the research and development survey is a source for fulfilling the obligations of the Slovak Republic resulting from the requirements of the European Statistical System, the requirements of international institutions and to meet the needs of the national information system. The outputs are provided to international and national organizations on a regular annual basis.

Until 2003, R&D data were reported to Eurostat on the basis of a gentlemen's agreement. In 2003, Decision No. 1608/2003 / EC of the European Parliament and of the Council of 22 July 2003 concerning the production and development of Community statistics on science and technology was adopted. For the reference years 2003 to 2011, the submission of data to Eurostat was based on Commission Implementing Regulation No. 753/2004 of 22 April 2012 laying down detailed rules for the implementation of Decision No. 1608/2003 / EC. From the reference year 2012 onwards, the updated Commission Implementing Regulation No. 995/2012 is applied.

## 7 Confidentiality

### 7.1 Confidentiality - policy

Protection of statistical confidentiality (protection of confidential statistical data) is a system of interconnected measures in legislative, methodological, organizational, technical, security, personnel area, which are preventing leakage of confidential statistical data or untimely publication of statistical information. Authorities or bodies executing state statistics shall adhere the obligation to ensure protection confidential statistical data as specified in §25a a §29 and §30 of the Act No 540/2001 on state statistics.

Principles of applying protection of confidential statistical data are available on the website of the Statistical Office of the SR (only in Slovak) at:

<https://slovak.statistics.sk/wps/portal/ext/services/infoservis/confidential>

### 7.2 Confidentiality - data treatment

Confidential statistics are not published. In publications and databases of the Statistical Office of the Slovak Republic, the symbol "D" is used instead of such data. Only research bodies for scientific purposes may have access to confidential data, for details see paragraph 10.4 of this report.

## 8 Release policy

### 8.1 Release calendar

Data are not subject to publication in the Release calendar.

Basic data from the survey on research and development are published on the SO SR portal by the end of July after the reference period and data in various breakdowns and structure in database DATAcube. by the end of September.

### 8.2 Release calendar access

Not relevant.

### 8.3 User access

The Policy on dissemination is defined in accordance with the Act on State Statistics, the development strategy of the Statistical Office of the SR, the information dissemination strategy of Eurostat and European Statistics Code of Practice.

Principles of release and provision of statistical information are available on the website of the Statistical Office of the SR at:

<https://slovak.statistics.sk/wps/portal/ext/services/infoservis/principles>

## 9 Frequency of dissemination

Annual.

## 10 Accessibility and clarity

### 10.1 News release

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### 10.2 Publications

Yearbook of Science and Technology is available on the website of the SO SR at:

<https://slovak.statistics.sk/wps/portal/ext/themes/multi/science/publications>

Statistical Yearbook of the Slovak Republic - contains selected indicators also for research and development.

### 10.3 On-line database

Databases of the SO SR: DATAcube, STATdat on the website of the SO SR at:

<https://slovak.statistics.sk/wps/portal/ext/Databases>

### 10.4 Micro-data access

Micro data are not published. Access to anonymised microdata may **only** be **for scientific purposes** by research entities

- universities and other higher education educational organizations
- scientific research organizations or institutions.

The conditions for granting access to confidential statistical data for scientific purposes are listed on the website of the SO SR at:

<https://slovak.statistics.sk/wps/portal/ext/services/infoservis/access>

### 10.5 Other

Specific outputs are provided to international and national organizations, in particular to the OECD, central government bodies and professional and trade unions.

### 10.6 Documentation on methodology

Methodology of research and development statistics is based on the international methodology for collecting and reporting research and development data "Frascati manual 2015". The manual in English can be found on the OECD website at:

<https://www.oecd-ilibrary.org/docserver/9789264239012-en.pdf?expires=1553692695&id=id&accname=guest&checksum=A2E276BC594749A839C48417C8675441>

Methodological information on R&D statistics is provided in the survey questionnaire VV 6-01 on research and development, in publications and tables in the public database of the Statistical Office of the Slovak Republic.

## 10.7 Quality documentation

Internal documentation of the Statistical Office of the SR on ensuring the quality of statistical outputs: internal Methodological directive for application of mathematical-statistical methods for statistical surveys MET-3/201, internal methodological directive - Quality indicators of statistical outputs and statistical processes MET-2/2012.

Quality reports for particular R&D performing sectors in accordance with the ESS Handbook for Quality Reports (EQHQR) are prepared in the ESS Metadata Handler environment on a two-yearly basis, based on Eurostat requirements.

## 11 Quality management

### 11.1 Quality assurance

Statistical Office of the SR has established the system of quality management. Quality manual contains description of system of quality management and fulfillment of requirements of standard ISO 9001. The application of the manual in practice ensures that all activities with impact on the quality of statistical products are planned, managed, examined, evaluated and meet the requirements accepted in the customer order. Quality manual is available at:

[https://slovak.statistics.sk/wps/wcm/connect/9ca43aa4-bfaf-4101-9dae-5263aa834df7/Prirucka\\_kvality.pdf?MOD=AJPERES&CVID=mu8R9IM&CVID=mu8R9IM](https://slovak.statistics.sk/wps/wcm/connect/9ca43aa4-bfaf-4101-9dae-5263aa834df7/Prirucka_kvality.pdf?MOD=AJPERES&CVID=mu8R9IM&CVID=mu8R9IM)

The basis of the whole system of quality management is European Statistics Code of Practice: <https://slovak.statistics.sk/wps/portal/ext/aboutus/key.documents/code.of.practise>

### 11.2 Quality assessment

The quality of R&D statistics is very good. The coverage of the R&D survey, the reference period, the data collection, the control and the processing of the data are governed by Eurostat methodology and recommendations for the production of common R&D statistics of the EU Member States.

The main strengths of the survey:

- The R&D survey is an exhaustive survey.
- The methodology is in line with the Frascati Manual 2015 methodology and harmonized Eurostat / OECD data collection.
- Enables the fulfillment of the obligations of the Slovak Republic to report data according to Commission Regulation (EU) No. 995/2012.
- The process of data collection and output generation is ensured within the integrated statistical information system, which incorporates controls for data collection and output generation algorithms that ensure the quality of output information. To evaluate the quality, the system provides statistics on the return of completed questionnaires, the number of erroneous questionnaires, the number of reminders, etc.

## 12 Relevance

### 12.1 User needs

The share of R&D expenditure in GDP (R&D intensity) is one of the five main target indicators set by the Europe 2020 strategy.

The main users of R&D data are: European Commission - Directorates-General for Research and Innovation, DG JRC, Eurostat, OECD, UNESCO, central government, research organizations, academia, researchers and doctoral students, professional associations, etc.

### 12.2 User satisfaction

Since 2009, the Statistical Office of the Slovak Republic has carried out at two-year intervals customer satisfaction surveys. The purpose of the survey is to obtain information on users interest and opinion regarding provision and quality of statistical products and services. Result of the survey in 2017 is published on the website of the Statistical Office of the SR.

<https://slovak.statistics.sk/wps/portal/ext/aboutus/marketing/survey.of.satisfaction>

In this user satisfaction survey, R&D has been linked with areas of innovation and information society statistics, therefore does not accurately reflect the satisfaction with R&D statistics.

Communication with customers in case of specific requirements implies that users of R&D statistics are satisfied.

### 12.3 Completeness

100% compared to the relevant legislation - Commission Regulation no. 995/2012.

Time series of data for particular indicators are available in the public database of the Statistical Office of the SR and in the Eurostat database.

## 13 Accuracy and reliability

### 13.1 Overall accuracy

The overall accuracy of R&D statistics is very good. The SO SR makes a great effort to prevent errors in data and performs consistent data verification to detect errors.

### 13.2 Sampling error

Not relevant. The research and development survey is exhaustive, not sample.

### 13.3 Non-sampling error

To avoid non-sampling errors, i.e. errors in the process of collection and processing the Statistical Office of the Slovak Republic has integrated in the integrated statistical information system (ISIS) logical and data checks at level of micro-data and aggregated data, which are performed during the data collection and processing.

The electronic questionnaire itself provides many arithmetic and logical checks between variables, which we distinguish between serious and informative. If there are serious errors in the form, it is not accepted and, after consultation with the reporting unit, it will be corrected so that it is correct and entered into processing. With these tools we try to minimize errors in the actual collection and subsequently during the data processing.

In the R&D survey, data for unit non respondents are neither imputed nor added up. In case of known R&D performers, we obtain the completed questionnaire after the reminder. For those

non-responders that may potentially carry out research and development (there is no information whether they actually do), we assume that they did not conduct research in the given year. For this reason, the collected data on research and development are not adjusted; the outputs represent the sum of the data actually collected. There are no item non-responses in the questionnaire, the filling of relevant items is ensured by built-in automatic checks during data collection.

## **14 Timeliness and punctuality**

### **14.1 Timeliness**

The publication of data in the public database of the SO SR is governed by an internal timetable. Data on research and development are published up to 9 months after the end of the reference year.

Data are provided to Eurostat in accordance with Commission Regulation No. 995/2012 as follows: provisional selected data up to the 10th month after the end of the reference year and a complete set of definitive data up to the 18th month after the end of the reference year.

### **14.2 Punctuality**

Publication deadlines are respected.

## **15 Coherence and comparability**

### **15.1 Comparability - geographical**

Research and development statistics are compiled for the whole territory of the Slovak Republic. In classification by geographical area (region), local units are taken account.

### **15.2 Comparability - over time**

Basic data are comparable over the entire time series. In 2016 and 2018, the implementation of the revised Frascati Manual 2015 methodology introduced several new indicators and changes in the methodology of existing indicators.

Extending the concept of R&D personnel by inclusion of external R&D personnel and as well as unpaid R&D owners and family members in the business sector working in R&D since 2016 (formerly employees only) and since 2018 the introduction of their monitoring in head counts according to the overall status during the year (previously as of 31 December) had an impact on the increase of the number of R&D personnel in 2016 and 2018.

For comparison of research and development personnel data a more satisfactory indicator is the expression in FTE, i.e. in full-time equivalent.

The refinement of the methodology in the R&D expenditure indicators did not affect the time series of the data.

### **15.3 Coherence - cross domain**

Comparison with other statistical domains is relevant only for the business sector and for the population of large reporting units (over 250 employees). It is compared with the annual structural business statistics and innovation statistics. The comparison results show a high level of comparability. The differences occurring are subject to further analysis, mostly due to an earlier date for the collection of R&D data, where some companies do not yet have more accurate or definitive data.



## 15.4 Coherence - internal

There are no deviations, the statistical outputs are internally consistent.

## 16 Cost and burden

Estimation is based on the time required to complete the questionnaire provided by respondents. Costs in hours for all reporting units for 2018: 3793 hours. Average hours worked by one respondent in completing the questionnaire: 6.0 hours.

## 17 Data revision

### 17.1 Data revision - policy

The revision policy regulates the basics rules and general procedures for revisions of preliminary compiled data and also for revisions due to other reasons. The revision policy and the revision calendar are available on the website of the Statistical Office of the SR (only in Slovak): <https://slovak.statistics.sk/wps/portal/ext/products/revisions>.

### 17.2 Data revision - practice

The data are considered definitive on first publication and are usually not subject to revision. In the event of any revision (also in previous years), a note is placed in the databases and in the relevant publications of the SO SR, indicating that the data have been revised. Changes in methodology are announced after their introduction in the form of methodological notes or notes to published data.

## 18 Statistical processing

### 18.1 Source data

The research and development statistics is compiled on the basis of an exhaustive survey VV 6-01 - Annual research and development report.

### 18.2 Frequency of data collection

Annual.

### 18.3 Data collection

Electronic data collection enabling reporting units to fill in statistical forms online in the integrated statistical information system of the SO SR.

Since 1 January 2016, reporting units (legal entities, natural persons - entrepreneurs) have been obliged to submit statistical reports electronically in accordance with the amendment to Act no. 540/2001 Coll. on State Statistics as amended by Act No. 326/2014 Coll., Which contains new rules for the submission of statistical reports.

### 18.4 Data validation

Data validation is embedded in the integrated statistical information system (ISIS) of the SO SR. When collecting data, the following checks are distinguished:

1- formal checks carried out automatically in the data collection process

2- informal checks to check the complexity and relationships between variables.

In terms of severity of errors, a distinction is made between:

I - Infomatic errors - provide additional information that is necessary for the process of data checking and correction. They provide information on possible exceedances of the set limits, partial non-response, etc.

Z - serious errors - refer to specific errors that must be corrected or justified by the reporting unit.

These errors are consulted with the reporting unit and corrected by employees of the SO SR.

Controls and algorithms for creation of outputs, which ensure their required quality, are also defined in the ISIS system.

### **18.5 Data compilation**

The research and development survey is an exhaustive survey. The collected data are summarized by particular classifications.

### **18.6 Adjustment**

Data not being adjusted. The published data for R&D statistics are aggregated data reported by reporting units.

## **19 Comment**