REPUBLIC OF CROATIA
CROATIAN BUREAU OF STATISTICS

150 YEARS OF CROATIAN STATISTICS

QUALITY REPORT FOR STATISTICAL SURVEY

Human resources in science and technology

2022

Organisational unit: Innovations, Science and Technologies Unit
Prepared by: Matija Škegro Vdović, Antonio Tomislav Marić

June 2025

0. Basic information

- Purpose, goal, and subject of the survey

The Human Resources in Science and Technology (HRST) domain provides data on stocks and flows (where flows are further divided into job-to-job mobility and education inflows). Stocks and flows are the main statistics of HRST. Their methodologies are interrelated and are therefore presented together in a single metadata file. This metadata file is duplicated in the structure of the Eurostat online database, while statistics for stocks and flows are presented in separate maps. Several discussions are available for the stock and flow indicators: sex, age, region, sector of economic activity, occupation, education, fields of education, although not all combinations are possible. Data on stocks and job-to-job mobility are obtained from the European Union Labour Force Survey (EU LFS). National statistical institutes are responsible for conducting the survey and transmitting the results to Eurostat. Data on education inflows are obtained from the Eurostat Education Database and then via the UNESCO/OECD/Eurostat Education Questionnaire. National statistical institutes are responsible for conducting the survey, collecting the results and transmitting the results to Eurostat. Please note that for sections where metadata for regional data is not provided, the regional metadata are identical to the metadata provided for national data.

- Reference period

Calendar year.

- Legal acts and other agreements

Act on Scientific Activity and Higher Education (Official Gazette, Nos. 123/03, 198/03, 105/04, 174/04, 02/07, 46/07, 45/09, 63/11, 94/13, 139/13, 101/14, 60/15 and 131/17)
Decision on the National Classification of Activities 2007 – NKD 2007 (Official Gazette, Nos. 58/07 and 72/07)
Regulations on the Register of Spatial Units (Official Gazette, No. 37/20)
National Classification of Occupations 2010 – NKZ 10 (Official Gazette, Nos. 147/10 and 14/11.)
Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019 on European business statistics and repealing ten legal acts in the field of business statistics (OJ L 327, 17. 12. 2019)
Commission Implementing Regulation (EU) 2020/1197 of 30 July 2020 laying down technical specifications and modalities pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council on European business statistics and repealing ten legal acts in the field of business statistics (OJ L 271, 18. 8. 2020)
Canberra Manual – Manual on the Measurement of Human Resources devoted to S&T, OECD 1995
International Standard Classification of Education – ISCED 2011, UNESCO – UIS 2012

- Classification system

National Classification of Occupations 2010 (NKZ 10.), comparable to the international classification of occupations ISCO-08
International Standard Classification of Education ISCED 2011

- Concepts and definitions

The harmonised concepts, methods and definitions used to analyse and report data on human resources in science and technology originate from the Manual on the Measurement of

Human Resources devoted to Science and Technology, the Canberra Manual2) (OECD, UNESCO, International Labour Organisation, the European Commission Directorate-General for Research and Innovation and the Eurostat).The Canberra Manual describes highly skilled human resources as essential for the development and transfer of knowledge and as a crucial link between technological advancement, economic growth and social development. The aim is to explore basic characteristics of the part of the labour force with highly developed skills and the largest potential to contribute to the knowledge-based society. In order to obtain the full picture of demand for and supply of human resources in science and technology, the definition is based on two aspects, qualification and occupation. The qualification aspect presents the supply of human resources in science and technology, that is, the number of persons currently or potentially available for work at a particular level. The demand for human resources in science and technology, that is, the number of persons actually needed in science and technology activities at a particular level, is connected with the occupation aspect. Because demand does not always match supply and because skills can be obtained outside the formal education system, the following combined definition is proposed. The Canberra Manual defines human resources in science and technology as persons fulfilling at least one of the following two conditions:

- human resources by education (HRSTE): persons who have successfully completed a university-level education (ISCED 5, 6, 7 or 8)
- human resources by occupation (HRSTO): persons who are employed in science and technology occupations as professionals, technicians and associate professionals and managers.

The group that fulfils both criteria is called HRST core (HRSTC).

In the education system of the Republic of Croatia, the levels of education that we need for the analysis of data on human resources in science and technology by education (HRSTE) are as follows:

according to the pre-Bologna programme
- Undergraduate professional study (ISCED level 5)
- Undergraduate university study (ISCED level 7)

according to the Bologna programme
- Professional short-term study (ISCED level 5)
- Undergraduate professional study (ISCED level 6)
- Specialist professional graduate study (ISCED level 7)
- Undergraduate university study (ISCED level 6)
- Graduate university study (ISCED level 7)
- Integrated undergraduate and graduate study (ISCED level 7)

Doctorate of science (ISCED level 8)

The Canberra Manual recommends the identification of certain occupation groups as those included in the HRSTO, as follows:

- NKZ 10, major group 2: (professionals) – occupations that increase the existing stock of knowledge, apply scientific or artistic concepts and theories and systematically transfer the mentioned knowledge or combine the mentioned activities.
- NKZ 10, major group 3: (technicians and associate professionals) – occupations that cover mostly technical and related tasks connected with research and the application of scientific or artistic concepts and operational methods as well as state administration tasks.
- NKZ 10, groups 12, 13 and 14: (administrative and commercial managers, production and specialised services managers, hospitality, retail and other services managers).

Classifications used:

a) The International Standard Classification of Education ISCED 2011 was used in coding the education variable.

b) The National Classification of Occupations 2010 (NKZ-10), comparable to the International Standard Classification of Occupations ISCO-08, was used in coding the occupations.

- Statistical units

The statistical unit for which data is collected are persons.

- Statistical population

The target population for which data is collected are people aged 25 to 64.

1. Relevance

1.1. Data users

Users of data on human resources in science and technology can be:
external (national): Ministry of Economy and Sustainable Development - data is used for the purposes of planning, creating policies and strategies, monitoring their implementation, analysis and for international comparisons, Ministry of Science and Education, - Croatian Agency for Small Business, Innovation and Investment (HAMAG – BICRO) - scientific and research institutes (Institute of Economics) - data is used for domestic and international scientific and research projects, - independent researchers;
external (international): Eurostat

1.1.1. User needs

The standard prescribed by Eurostat satisfies domestic and foreign users.

1.1.2. User satisfaction

The first user satisfaction survey of the Croatian Bureau of Statistics was conducted in 2013, the second one in 2015, and the last one at the end of 2022. The survey results can be checked on the website of the Croatian Bureau of Statistics https://dzs.gov.hr/highlighted-themes/quality/user-satisfactionsurveys/686

1.2. Completeness

The survey was conducted at the Croatian Bureau of Statistics on the basis of the Official Statistics Act (OG, No. 25/20). The legal basis of the European Union for the implementation of the survey is Regulation (EU) No. 2019/2152 of the European Parliament and of the Council of 27 November 2019 on European business statistics and repealing ten legal acts in the field of business statistics (OJ L 327, 17. 12. 2019) and Commission Implementing Regulation (EU) No. 2020/2152 of 30 July 2020 laying down technical specifications and modalities in accordance with Regulation (EU) No. 2019/2152 of the European Parliament and of the Council on European business statistics and repealing ten legal acts in the field of business statistics (OJ L 271, 18. 8. 2020). The survey covers all variables prescribed by EU regulations and Eurostat methodological standards. The survey results are submitted to Eurostat according to a given template.

1.2.1. Data completeness rate

The indicator is not computed.

2. Accuracy and reliability

Accuracy in statistics refers to the accuracy of a calculation or an estimate of an exact value. Statistical values are not equal to true values due to variability (statistics vary depending on the type of survey) and bias (depending on the survey, the average of possible statistical values is not equal to the exact value). There are two types of errors (bias and variability) in surveys - sampling errors and non-sampling errors. Non-sampling errors are divided into coverage errors, measurement errors, processing errors, non-response errors, and model selection errors.

2.1. Sampling error

Not applicable.

2.1.1. Sampling error indicators

The indicator is not applicable.

2.2. Non-sampling error

Not applicable.

Non-sampling errors can occur at all stages of research. Along with sampling errors (if any) they contribute to reducing the overall accuracy. It is important to assess their relative weight in the total error due to control and estimation.

2.2.1. Coverage error

The difference depends on the data taken from the administrative source.

2.2.2. Overcoverage rate

The indicator is not computed.

2.2.3. Measurement errors

Not applicable. No analyses were conducted to assess the main sources of error in this research.

2.2.4. Non-response errors

Not applicable.

Non-response error occurs when a survey does not collect data on all survey variables from all units designated for data collection in a sample or frame. There are two types of non-response errors – enterprise non-response (when data are not collected or a negligible number are collected for a given population) and individual non-response (when data are collected on only some, but not all, survey variables for a given population).

2.2.5. Unit non-response rate

The non-response rate for 2022 was 41.5% and the refusal rate was 22.9%.

2.2.6. Item non-response rate

The indicator is not computed.

2.2.7. Processing errors

Input and processing errors that occur at the sources are eliminated by the automatic data processing process. Processing errors are possible due to inadequate automatic data processing (over-processing of data).

2.2.8. Imputation rate

The indicator is not applicable.

2.2.9. Model assumption error

Not applicable.

2.3. Data revision

2.3.1. Data revision – policy

The users of statistical data are informed about revisions on the website of the Croatian Bureau of Statistics, on the link – General Revision Policy of the CBS.

2.3.2. Data revision – practice

The research does not publish temporary data and therefore there are no data revisions.

2.3.3. Data revision – average size

The indicator is not computed.

2.4. Seasonal adjustment

The indicator is not applicable for the survey.

3. Timeliness and punctuality

3.1. Timeliness

Timeliness of statistics relates to the length of time between data availability and reference period the phenomenon refers to.

Timeliness of final results is T + 12 months.

3.1.1. Timeliness – first results

Not applicable.

3.1.2. Timeliness – final results

Timeliness of final results is T + 12 months.

3.2. Punctuality

Timeliness of final results is T + 12 months.

3.2.1. Punctuality − delivery and publication

Data are published within the planned deadline, in accordance with the Calendar of Statistical Data Issues 2023.

4. Accessibility and clarity

The medium used for the dissemination of research data on Human resources in science and technology is the First Release ZTI-2023-2-3 "Human resources in science and technology in 2022". announcement on the website of the Croatian Bureau of Statistics.

4.1. News release

Survey data are released in the First Release ZTI-2023-2-3. "Human resources in science and technology in 2022".

4.2. Online database

Not applicable.

4.3. Microdata access

The conditions under which certain users may have access to microdata are prescribed by the Ordinance on the conditions and manner of using confidential statistical data for scientific purposes.

4.4. Documentation on methodology

Methodological documents are available in the Release in electronic version on the website of the Croatian Bureau of Statistics.

5. Coherence and comparability

5.1. Asymmetry for mirror flows statistics

The indicator is not applicable for the survey.

5.2. Comparability over time

The data are comparable with data from 2016, when a data revision was carried out due to improvements in several statistical production processes.

5.2.1. Length of comparable time series

Length of comparable time series is 6.

5.2.2. Reasons for break in time series

A break in the time series occurred in 2016 due to the improvement of several statistical production processes.

5.3. Coherence – short-term and structural data

The indicator is not computed.

5.4. Coherence – national accounts

The indicator is not computed.

5.5. Coherence – administrative sources

The indicator is not applicable.

6. Cost and burden

6.1. Cost

It is not possible to estimate data collection costs.

6.2. Burden

An analysis of the burden on reporting units has not been carried out.