REPUBLIC OF CROATIA
CROATIAN BUREAU OF STATISTICS

150 YEARS OF CROATIAN STATISTICS

QUALITY REPORT FOR STATISTICAL SURVEY

Innovation in Enterprises
2020 – 2022

Organisational unit: Innovations, Science and Technologies Unit

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0. Basic information

- Purpose and subject of the survey

  The aim of the statistical survey on innovation activities in enterprises is to determine a share and characteristics of innovative enterprises in the Republic of Croatia in the period from 2020 to 2022. Innovative enterprises are all business entities that introduced a new or improved product (good or service) or business process (or their combination) in the period from 2020 to 2022, which significantly differs from previous products or business processes in the enterprise and was introduced to the market (product or service) or started to be applied in the enterprise (process). Product innovation must be available to potential customers, but it does not necessarily affect sales. Business process innovation is introduced when an enterprise starts using it continuously in its operations (business activities). Accordingly, data collected in the survey Innovation Activities in Enterprises in the period from 2020 to 2022 provide an insight to the detailed information on the following:

  - enterprises according to their innovation, activity and size (innovative enterprises, non-innovative enterprises, share of innovators, share of innovators in turnover, share of innovators in persons in employment) and all these categories for industrial and service enterprises (small, medium-sized and large).
  - share of innovation active enterprises in turnover and in persons in employment, by activities (enterprises total, industrial enterprises, service enterprises)
  - enterprises with innovation expenditure, by type of innovation expenditure, activity and size in 2022 (total, research and development (R&D) performed in-house, external R&D, other innovation expenditure) and all these categories for industrial and service enterprises (small, medium-sized and large).
  - innovative enterprises by activity, size and innovation with significant environmental benefit introduced within the enterprise
  - innovative enterprises that developed product or process innovation by themselves or together with other enterprises or institutions, by activity and size
  - innovative enterprises that received any public financial support and used it for research and development or other innovation activities
  - innovative enterprises that collaborated on other innovation activities with other enterprises or institutions, by kind and location of cooperation partner (cooperation partners from the business sector of the enterprise or outside of it).

- Reference period

  Multiple calendar years, 2020 – 2022

- Legal acts and other agreements

  Legal acts that determine liability and authorisation of the Croatian Bureau of Statistics related to collection, processing and dissemination of statistics:

  Official Statistics Act (NN, No. 25/20)

  Annual Implementation Plan of Statistical Activities of the Republic of Croatia 2023 (NN, No. 35/23.)

  - Relevant national standards:
    - Act on Scientific Activity and Higher Education (NN, 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 (NN, Nos 58/07 and 72/07)
    - Ordinance on Register of Spatial Units (NN, No. 37/20)

- Relevant international standards:
  - Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, 2018
  - Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019 on European business statistics, repealing 10 legal acts in the field of business statistics (OJ L 327, 17 December 2019)
  - Commission Implementing Regulation (EU) 2022/1092 of 30 June 2022 laying down technical specifications of data requirements for the topic 'Innovation' pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council

- Classification system

  National Classification of Activities 2007

  Codebook of Countries

- Concepts and definitions

  Innovative enterprises are all business entities that introduced a new or improved product (good or services) or business process (or their combination) in its operations in the period from 2020 to 2022, which significantly differs from previous products or business processes in the enterprise and was introduced to the market (product) or started to be applied in the enterprise (process). Product innovation must be available to potential customers, but it does not necessarily affect sales. Business process innovation is introduced when an enterprise starts using it continuously in its operations (business activities). Product innovation is a new or improved good and/or service introduced to the market, which differs significantly from the enterprise's previous goods or services. Products include tangible objects and digital products, as well as software.

  Services are intangible activities that are produced and consumed at the same time, e.g. retail, banking services, hotel accommodation, insurance, educational courses, air transport, consulting services, etc.

  Product innovation includes significant changes in the design of a good or service and digital product or service. It excludes pure resale of new products and services and aesthetic changes. Business process innovation is a new or improved business process introduced in an enterprise for one or more business functions, which differs significantly from the enterprise's previous business processes.

  Innovation activity includes all development, financial and commercial activities that an enterprise undertakes with the intention of developing or introducing an innovation.

  Product innovators are enterprises that introduced a product and/or service innovation in the period from 2020 to 2022. Process innovators are enterprises that introduced a business process innovation in the period from 2020 to 2022.

  Industrial activities in this survey are as follows: Mining and quarrying (05 – 09), Manufacturing (10 – 33), Electricity, gas, steam and air conditioning supply (35) and Water supply; sewerage, waste management and remediation activities (36 – 39). Service activities in this survey are as follows: Construction (41 – 43)*, Wholesale trade, except of motor vehicles and motorcycles (46), Transportation and storage (49 – 53), Accommodation and food service activities (55 – 56)*, Information and communication (58 – 63), Financial and insurance activities (64 – 66), Real estate activities (68)*, Architectural and engineering activities; technical testing and analysis (71), Scientific research and development (72) as well as Advertising and marketing research (73). Activities marked with an asterisk are included in the analysis of innovation activities because of their significance in the Croatian economy.

  Small enterprises are enterprises employing 10 to 49 persons. Medium-sized enterprises are enterprises employing 50 to 249 persons. Large enterprises are enterprises employing 250 and more persons.

Research and 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. In-house R&D includes the R&D activities undertaken by an enterprise to create new knowledge or solve scientific or technical issues (including software development within the enterprise). It also includes current expenditures, labour costs and capital expenditure on buildings and equipment specifically intended for R&D.

External R&D includes the same activities as in the above definition, which are contracted-out to other enterprises (including other enterprises within its own enterprise group) or to public or private research institutions.

Other innovation expenditure includes the acquisition of machinery equipment, software, intellectual property rights or buildings for innovation activities other than R&D; the acquisition of external knowledge for innovation activities other than R&D (e.g. patents, licenses, trademarks); product or service design, and the preparation of production/distribution for innovation activities other than R&D; employee training and professional development for innovation activities other than R&D (e.g. employee training or continued education); marketing of innovations (marketing activities directly related to innovations, including market research).

They are harmonised with the European Union.

- Statistical unit

  Starting with this survey wave (Survey on the Innovation Activities of Enterprises in the Period from 2020 to 2022), the main observation/statistical unit is the enterprise in accordance with Council Regulation 696/1993 on statistical units for the observation and analysis of the production system within the Community and according to Annex II of the Regulation EU 2019/2152 of the European Parliament and the Council of 27 November 2019 on European business statistics and repealing 10 legal acts in the field of business statistics. This wave of the survey is regulated by Commission Implementing Regulation (EU) 2022/1092 of 30 June 2022 laying down technical specifications of data requirements for the topic ‘Innovation’.

  Enterprises are divided into three size classes with regards to the number of persons in employment:

  - 10 – 49 persons in employment – small enterprises
  - 50 – 249 persons in employment – medium-sized enterprises
  - 250+ persons in employment – large enterprises.

- Statistical population

  Target (mandatory) population encompasses active enterprises employing 10 and more employed and self-employed persons.

  Basic (mandatory) population encompasses all enterprises with a main activity classified among the following NKD 2007 sections and divisions:

  1) Section B: Mining and quarrying (05 – 09)
  2) Section C: Manufacturing (10 – 33)
  3) Section D: Electricity, gas, steam and air conditioning supply (35)
  4) Section E: Water supply; sewerage, waste management and remediation activities (36 – 39)
  5) Section (G): Wholesale trade, except of motor vehicles and motorcycles (46)
  6) Section H: Transportation and storage (49 – 53)
  7) Section J: Information and communication (58 – 63)

8) Section K: Financial and insurance activities (64 – 66)
9) Section (M): Architectural and engineering activities; technical testing and analysis (71)
10) Section (M): Scientific research and development (72)
11) Section (M): Advertising and marketing research (73)

Additional target population encompasses the following NKD activities:

1) Section F: Construction (41 – 43)
2) Section I: Accommodation and food service activities (55 – 56)
3) Section L: Real estate activities (68)

1. Relevance

1.1. Data users

Users of data on innovation activities in enterprises:

- External users – national:
  - Ministry of Economy and Sustainable Development – uses data for the purposes of planning, creating of policies and strategies, monitoring their implementation, analyses and for international comparisons
  - Ministry of Science and Education
  - Croatian Agency for SMEs, Innovation and Investments (HAMAG-BICRO)
  - science and research institutes (Institute of Economics) – use data for national and international scientific and research projects aimed at analysing innovation, competitiveness of Croatian enterprises, making comparative analyses
  - individual researchers – use data for scientific and research projects
- External users – international:
  - directorate-generals for policies of the European Commission – use survey data for a systematic and user-oriented presentation of internationally comparable indicators on innovation activities of enterprises (for all EU Member States).

1.1.1. User needs

The standard prescribed by Eurostat meets the needs of national and international users.

1.1.2. User satisfaction

User satisfaction, targeted specifically at the Survey on Innovative Activities of Enterprises data, is not measured.

The first survey on satisfaction of users of the Croatian Bureau of Statistics was carried out in 2013, then in 2015, and the most recent one at the end of 2022. The results can be checked out on the website of the Croatian Bureau of Statistics https://dzs.gov.hr/highlighted-themes/quality/user-satisfaction-surveys/686

1.2. Completeness

The survey was conducted by the Croatian Bureau of Statistics and was completely harmonised with the Community Innovation Survey, which is conducted in the European Union every two years. The survey encompasses all mandatory and non-mandatory variables prescribed in the Commission Implementing Regulation (EU) 2022/1092 of 30 July 2022 laying down technical specifications of data requirements for the topic 'Innovation' pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019 on European business statistics repealing 10 legal acts in the field of business statistics.

1.2.1. Data completeness rate

All indicators are regularly computed as prescribed by the Regulation and all items in the report of metadata have been entered.

2. Accuracy and reliability

2.1. Sampling error

The sampling error can be expressed in the following ways:

- in the absolute sense – as a standard error
- in the relative sense – as a variation coefficient
- in the confidence sense – as a confidence interval.

According to Eurostat's methodological recommendations, a certain precision level should be achieved for the following indicators: 1) share of innovative enterprises, 2) share of innovators who introduced a new or significantly improved product to the market, 3) turnover from new or significantly improved products as a share in a total turnover, 4) share of enterprises involved in the cooperation in innovation activities (in a total number of innovators of products and/or processes), 5) total turnover per employed person. A 95% confidence interval for indicators 1, 2 and 3 should be ±0.05, for indicator 4 it should be ±0.10 and for indicator 5 it should be ±10% of estimate.

2.1.1. Sampling error indicators

Sampling error indicators for selected variables:

Statistic	Domain	Domain value	Notice	Value
Share of innovative enterprises	All enterprises	Variation coefficient		0.037
Share of enterprises that introduced a new product on the market	All enterprises	Variation coefficient		0.050
Share of turnover from new/improved products in total turnover	All enterprises	Variation coefficient		0.054
Share of innovative enterprises involved in cooperation in a total number of innovative enterprises	All enterprises	Variation coefficient		0.066
Turnover per employed person	All enterprises	Variation coefficient		0.085

2.2. Non-sampling error

Non-sampling errors emerge in all stages of the survey. Together with sampling errors (if any), they cause lessening of total accuracy. It is important to estimate their relative weight in the total error for check and assessment.

2.2.1. Coverage error

Coverage errors (or frame errors) emerge due to divergences between the target population and the sampling frame. Sampling frame is a set of all available target members of a population that can be used as a basis for sampling. It is a list of all units in a population used as a basis for sampling, which contains details on the contact and sufficient information for stratification and sampling. Companies liquidated in the observed period are deleted from the sample and the target population, except if they have been liquidated at the end of the observed period, in which case they should be included in the target population. Undercoverage cannot be easily estimated due to the fact that it is not possible to know in advance which units are not included in the target population. There was no misclassification.

2.2.2. Overcoverage rate

The indicator is not computed.

2.2.3. Measurement errors

Measurement errors emerge in the course of data collection and generate bias by recording values that differ from correct values. The questionnaire used in data collection may cause recording of erroneous values or bias in respondents. There are three types of measurement errors: interviewer errors, respondent error or data entry errors. Interviewer errors do not occur in the survey on innovative activities in enterprises due to the fact that respondents (enterprises) fill in the questionnaire themselves. Respondent errors are minimised to the lowest extent by providing instructions in the questionnaire, built-in verification procedures and skips in the electronic questionnaire as well as commentary boxes and contact phone number in case of the need for further instructions. Filled-in questionnaires are verified and, in the case of detecting incomplete or inconsistent answers, reporting units are contacted to get accurate and complete answer. During the data processing, detailed data verification of all answers is carried out.

2.2.4. Nonresponse error

Nonresponse error occurs when the survey does not collect data on all variables from all units determined for data collection in a sample or framework. There are two types of non-response errors – non-response of enterprises (when data are not collected or their number is irrelevant for a particular population) and non-response to particular questions (when collected data do not refer to all survey variables of a particular population). The non-response rate was 23.9% (enterprises that did not respond or did not receive the announcement letter).

2.2.5. Unit nonresponse rate

Unweighted nonresponse rate is 23.9%.

Unweighted nonresponse rate is 27.2%.

2.2.6. Item nonresponse rate

The indicator is not computed.

2.2.7. Processing errors

In the period between data collection and the beginning of the statistical analysis based on the obtained statistics, data have to be processed in a certain way: coding, data entry, data editing, imputation, etc. Errors that occur in these stages are called processing errors. During the editing stage, inconsistencies are detected in data, which are usually indicative of errors. During the data processing, data verification of collected data is carried out. A part of data verification procedures is built in the questionnaire, while other rules are defined in the expert unit, which also corrects existing errors found on the material and, if necessary, contacts enterprises to get complete and accurate data. Processing errors have been reduced to the minimum. Any differences in classifying enterprises according to the NKD 2007 are doublechecked, while NKD 2007 sections of enterprises are selected from the drop-down menu. The questionnaire is composed in a way that respondents, i.e. enterprises, answer the questions by selecting (clicking) boxes next to offered answers, while answers to four questions, that is, 20 variables (expenditures for innovative activities, turnover, number of persons in employment) are entered manually, devoting special attention to them.

2.2.8. Imputation rate

The indicator is not applicable.

2.2.9. Model assumption error

In processing the collected data by using this survey, only methologically accurate models were applied, which are used in all EU Member States according to Eurostat's recommendations and therefore there is no model assumption error.

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 https://dzs.gov.hr/General Revision Policy of the CBS.

2.3.2. Data revision – practice

Provisional figures are not published in this survey and therefore regular revisions are not planned.

2.3.3. Data revision – average size

The indicator is not applicable.

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 + 18 months.

3.1.1. Time lag – first results

The indicator is not applicable.

3.1.2. Timeliness – final results

Timeliness of final results is T + 18 months.

3.2. Punctuality

The data were not released on time, but with a delay of one month because the statistical unit "enterprise" was implemented in the survey for the first time as well as due to the need for consolidation of collected data. Data were released: T + 19 months.

3.2.1. Punctuality − delivery and publication

Punctuality is 0.

4. Accessibility and clarity

The medium for disseminating data of the survey on innovation activities in enterprises is the First Release available on the website of the Croatian Bureau of Statistics.

4.1. News release

The Survey results were published in the First Release No. ZTI-2024-2-5 "Innovation Activities in Enterprises, 2020 – 2022".

4.2. Online database

Not applicable.

4.3. Microdata access

Conditions under which certain users can have access to microdata are regulated by the Ordinance on conditions and terms of using confidential statistical data for scientific purposes.

4.4. Documentation on methodology

Publications on methodology are available in the First Release under the subtitle Notes on Methodology.

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 first survey on innovation activities of enterprises was carried out in the Croatian Bureau of Statistics in 2007 for the reference period 2004 – 2006. Since then, the survey has been carried out in two-year periodicity. Data are available for the following reference periods: 2004 – 2006, 2006 – 2008, 2008 – 2010, 2010 – 2012, 2012 – 2014, 2014 – 2016, 2016 – 2018, 2018 – 2020 and 2020 – 2022. All available data are comparable, except for the reference period 2004 – 2006, when the National Classification of Activities, 2002, was applied, (for other periods, the NKD 2007. has been applied). The data are not comparable to the data from earlier survey waves due to the fact that all surveys prior to this one were carried out on legal units.

The data are not comparable to the data from the previous survey wave due to the fact that the survey for the period from 2018 to 2020 was carried out on legal units. They are neither comparable to the data from earlier periods due to changes in methodology (concerning the definition of innovations), which were carried out in the survey wave for the period from 2016 to 2018.

5.2.1. Length of comparable time series

Prior to this wave, the length of comparable time series was 8.

Starting with this wave, the definition of the statistical unit “enterprise” has been applied.

5.2.2. Reasons for break in time series

The break in time series occurred in 2009 in the survey for the period 2006 – 2008 due to the implementation of the new version of the National Classification of Activities. The break in time series also occurred in 2023, in the survey for the period 2020 – 2022, due to the change in the main observation/statistical unit “enterprise”.

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

Estimation of data collection costs has not been done.

6.2. Burden

An analysis of the burden on reporting units has not been carried out. The time needed to fill in the questionnaire depends on the size of the enterprise, number of persons in the enterprise involved in filling in the questionnaire and on the fact whether the enterprises had innovations or not.