REPUBLIC OF CROATIA
CROATIAN BUREAU OF STATISTICS

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QUALITY REPORT FOR STATISTICAL SURVEY

Innovation Activities in Enterprises

2016 – 2018

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

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0. Basic information

- Purpose, goal, 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 2016 to 2018. Innovative enterprises are all business entities that introduced a new or improved product or process (or their combination) in the period from 2016 to 2018, 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 2016 to 2018 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 enterprises).
- share of innovation active enterprises in turnover and in persons in employment, by activities (enterprises total, industrial enterprises, service enterprises)
- enterprises by type of innovation, activity and size (innovators total, product innovators only (goods and services), process innovators only, product innovators juxtaposed with process innovators)
- innovative enterprises by type of innovation (product innovators, process innovators, product and/or process innovators)
- enterprises with innovation expenditure, by type of innovation expenditure, activity and size (research and development (R&D) performed in-house, external R&D, other innovation expenditure)
- innovative enterprises that developed product or process innovation by themselves or together with other enterprises or institutions, by activity and size
- factors that made it difficult for enterprises to start innovative activities or their implementation, by the degree of importance.

- Reference period

Multiple calendar years.

- 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 (OG, Nos 103/03, 75/09, 59/12 and 12/13 – consolidated text)

Programme of Statistical Activities of the Republic of Croatia 2013 – 2017 (OG, No. 69/13)

Annual Implementation Plan of Statistical Activities of the Republic of Croatia 2019 (OG, No. 19/19)

- 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 – NKD 2007. (OG, Nos 58/07 and 72/07)
  - Ordinance on Register of Spatial Units (OG, No. 37/08)
- Relevant international standards:
  - Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, The Measurement of Scientific, Technological and Innovation Activities, OECD Publishing, Paris/Eurostat, Luxembourg
  - 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 (OJ L 230, 16 September 2003).
  - Commission Implementing Regulation (EU) No 995/2012 of 26 October 2012 laying down detailed rules for the implementation of Decision No 1608/2003/EC of the European Parliament and of the Council concerning the production and development of Community statistics on science and technology (OJ L 299, 27 October 2012).

- 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 or process (or their combination) in the period from 2016 to 2018, 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 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 products or services. 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 2016 to 2018. Process innovators are enterprises that introduced a business process innovation in the period from 2016 to 2018.

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), 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 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 units

Basic units with statistical characteristics observed to which data relate are enterprises – legal entities and natural persons. 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 statistical population encompasses active enterprises – legal entities and natural persons employing 10 or more persons – that are classified, according to their principal activity, into NKD 2007. sections B, C, D, E, F, G, H, I, J, K, L and M.

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. However, a general survey on user satisfaction was carried out in 2015, which provided an assessment of user satisfaction in the domains of education, research and development, and culture. According to the survey results, out of the total number of all CBS data users, as much as 27% inquired data in the domain of education, R&D and culture (the domain that includes this Survey as well) and graded data quality very high (3.61). More detailed survey results are available on the link http://www.dzs.hr/Eng/international/Quality_Report/Quality_Report_Documents/Quality_ReportSatisfaction_Survey.pdf.

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 includes all obligatory and non-obligatory variables prescribed by

the Commission Regulation (EC) No. 995/2012 of 26 October 2012 laying down detailed rules for the implementation of Decision No 1608/2003/EC of the European Parliament and of the Council concerning the production and development of Community statistics on science and technology.

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 co-operation in innovation activities (in a total number of innovators of products and/or processes), 5) total turnover per person in employment. 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 assessment.

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		0.023
Share of enterprises that introduced a new product on the market	All enterprises	Variation coefficient		0.029
Share of turnover from new/improved products in total turnover	All enterprises	Variation coefficient		0.055
Share of innovative enterprises involved in co-operation in a total number of innovative enterprises	All enterprises	Variation coefficient		0.051
Turnover per person in employment	All enterprises	Variation coefficient		0.026

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. Misclassification rate was 20.26% (number of enterprises that changed stratum in relation to the number of enterprises in a certain stratum that responded to the questionnaire).

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 does 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 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. Non-response errors

Non-response 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 25.1% (enterprises that did not respond or did not receive the announcement letter).

2.2.5. Unit non-response rate

Unweighted non-response rate is 24,5%.

Weighted non-response rate is 26,6%.

2.2.6. Item non-response 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 very 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 falling 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 six questions, that is, 23 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 (preliminary data, final data) on the website of the Croatian Bureau of Statistics.

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. Timeliness – first results

The indicator is not applicable.

3.1.2. Timeliness – final results

Timeliness of final results is T + 18 months.

3.2. Punctuality

Due to the COVID-19 pandemic and earthquakes, there was a three-month delay of releasing the data.

It is for this reason that timeliness of final results is T + 21 months.

3.2.1. Punctuality − delivery and publication

Punctuality is 0.

4. Accessibility and clarity

Media for disseminating data on innovation activities in enterprises:

- for printed publications – the First Release
- for website of the Croatian Bureau of Statistics – electronic versions of the First Release.

4.1. News release

The Survey results were published in the First Release No. 8.2.5. “Innovation Activities in Enterprises, 2016 – 2018”.

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 the Conditions and Manner of Use of Statistical Data for Scientific Purposes.

4.4. Documentation on methodology

Methodological documents are available in printed form of the First Release as well as an 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 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 and 2016 – 2018. 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).

5.2.1. Length of comparable time series

Length of comparable time series is 6.

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.

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

The fact that this wave of survey was carried out as a part of the project for which we were obliged to specify all costs provides the opportunity to give them in detail. The overall costs were slightly above 54 thousand euro (EUR 54 202.20). It accounted for 69.2% of the initially planned sum. Total personnel costs were below the planned sum (EUR 40 080.64 or 70.7% of the initially planned sum). Administration personnel costs were somewhat higher than the planned sum (EUR 640.78 or 13.4% more than the initially planned sum) due to the fact that it took more time to packing, addressing and sending announcement letters activities than it had initially been planned (data collection and monitoring of measure to increase the response). The difference between planned and realised amounts occurred because it was not possible to hire planned two persons due to changes in in-house procedures in the Croatian Bureau of Statistics.

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. It takes about 20 minutes for small enterprises to fill in the questionnaire, but filling in the questionnaire in large enterprises can take two hours, even longer if it had innovations. In addition, large enterprises need relatively short time to fill in the questionnaire, but the period needed for data collection is long due to the fact that many departments are involved in providing the data.