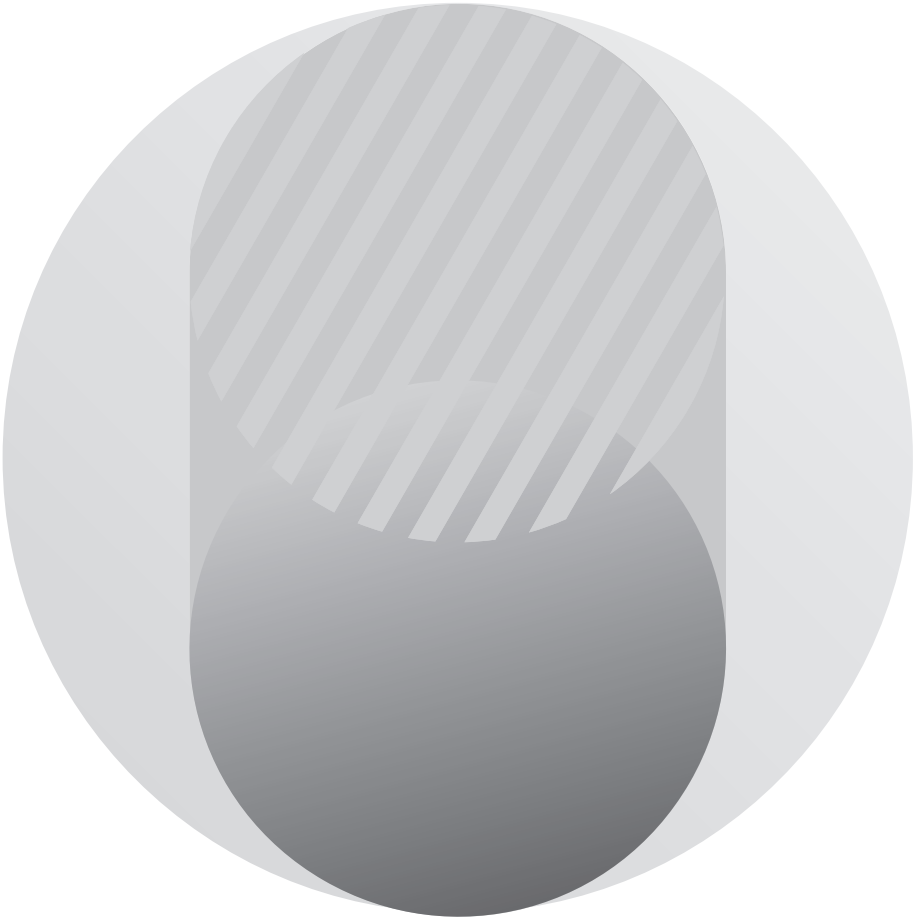
Statistical research methodology



Methodological report
Innovation activities of enterprises

Warsaw, Szczecin 2025

Statistical research methodology



Methodological report
Innovation activities of enterprises

Statistics Poland
Statistical Office in Szczecin

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Subjective scope of the survey	Innovation activities of enterprises. Intellectual property.
Survey type and method	National economy entities employing at least 50 persons conducting main activity classified according to PKD to sections B, C, D, E: full population. National economy entities employing from 10 to 49 persons conducting main activity classified according to PKD to sections B, C, D, E: representative population - 25% sample. National economy entities employing at least 10 persons conducting main activity classified according to PKD to sections H, J, K or divisions 46, 71, 72, 73: representative population - 25% sample. Selected national economy entities belonging to enterprise groups according to Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019: representative population – about 15% sample.
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Date of compiling the methodological report	June 2025

1 Belonging of legal entities to enterprise groups of entities included in the survey on the basis of above mentioned criteria constitutes a selection criterion.

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Main abbreviations

Abbreviation	Meaning
BDL	Local Data Bank
BDM	Macroeconomic Data Bank
BJS	Business Register
CIS	Community Innovation Survey
DBW	Knowledge Database
EU	European Union
Eurostat	Statistical Office of the European Union
GUS	Statistics Poland
HDC	Harmonised Data Collection
OECD	Organization for Economic Cooperation and Development
PBSSP	Statistical survey program of official statistics
PKD	Polish Classification of Activities
PS	Reporting Portal
R&D	Research and experimental development
SIB	IT system of the survey
US	Statistical Office

Introduction

Implementation of innovations by Polish enterprises and activities undertaken to develop them constitute a subject matter of the survey Innovations conducted by Statistics Poland.

An objective of the survey is providing information on innovation activities of enterprises in Poland covering all development, financial and commercial activities undertaken by an enterprise aiming at developing innovations for an enterprise. Obtained results provide information regarding types of innovation activities, expenditures on them as well as results in the form of innovations.

Data on innovation activities have been collected by Statistics Poland since the 1990s. Since 2009 the Statistical Office in Szczecin has been responsible for collecting and compiling statistical data in this regard. Up to 2021, innovation activities reporting was conducted with the use of two questionnaires: PNT-02 – Survey on innovations in industry and PNT-02/u – Survey on innovations in services. Starting with the 2019-2021 edition, the surveys have been combined into one – PNT-02 – Survey on innovations. Another change in previous years concerned the frequency of conducting the survey. It was conducted annually until 2022 and biennially since 2024.

PNT-02 survey for the years 2020-2022 was conducted for the first time with population ensuring data presentation for a statistical unit "enterprise"[2] in accordance with Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019 and Commission Implementing Regulation (EU) 2022/1092 of 30 June 2022. For the purposes of national publications and the databases of Statistics Poland, information pertaining to innovation activity will continue to be compiled on the basis of legal units. This approach is intended to ensure the temporal comparability of the data presented in this domain.

The survey methodology complies with guidelines developed by EUROSTAT and the OECD included in the Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, The Measurement of Scientific, Technological and Innovation Activities, by OECD/ Eurostat, 2018. In 2021, the Polish version of the Manual was published. Implementing guidelines included in the Manual ensures international comparability of data on innovation activities

The Act of 29 June 1995 on Official Statistics (Journal of Laws of 2024, item 1799) and the annual regulations of the Council of Ministers concerning the Statistical Survey Program of Official Statistics (PBSSP) establishing the survey programme for a given year constitute the basis for conducting the survey Innovations in Poland.

Commission Implementing Regulation (EU) 2020/1197 of 30 July 2020 laying down technical specifications and arrangements pursuant to Regulation (EU) 2019/2152 of the European Parliament and of the Council on European business statistics repealing 10 legal acts in the field of business statistics (OJ L 271, 18.8.2020, p. 1, as amended) is an international law instrument from which stems an obligation to implement the survey.

The following publication presents the methodology of the conducted survey on innovation activities. It comprises of seven chapters. The first chapter concerns the subjective and objective scope of the survey, the second one - the survey type and method. In the subsequent chapters data sources, variables used in the survey, organisation and management of survey implementation, data presentation and evaluation of survey quality are presented.

2 'Enterprise'– in accordance with Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019, Article 1(a) and 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 – 'is the smallest combination of legal units, that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations. An enterprise may be a sole legal unit.'.

1. Subjective and objective scope

Subjective scope

The survey on innovation activities covers national economy entities meeting criteria described in detail and selected national economy entities belonging to enterprise groups:

- basic legal form: legal persons, organisational units without legal personality, and natural persons conducting economic activities,
- specific legal form: professional partnership, joint-stock company, limited liability company, registered partnership, civil law partnership, limited partnership, limited joint-stock partnership, company foreseen by the provisions of laws other than the Commercial Companies Code and the Civil Code, state-owned enterprise, cooperative, branch of a foreign enterprise, enterprise without a specific legal form,
- number of persons employed – 10 persons and more,
- type of conducted activity by the Polish Classification of Activities (up to 2008 by the Polish Classification of Activities 2004, since 2009 by the Polish Classification of Activities 2007). The survey covers entities conducting economic activity classified by the Polish Classification of Activities (PKD 2007) to the following sections and divisions:

  Section B – Mining and quarrying,

  Section C – Manufacturing,

  Section D – Electricity, gas, steam and air conditioning supply,

  Section E – Water supply; sewerage, waste management and remediation activities,

  Division 46 – Wholesale trade, except of motor vehicles and motorcycle,

  Section H – Transportation and storage,

  Section J – Information and communication,

  Division 71 – Architectural and engineering activities; technical testing and analysis,

  Division 72 – Scientific research and development,

  Division 73 – Advertising and market research.

National economy entities employing at least 50 persons conducting main activity classified according to PKD to sections B, C, D, E: full population.

National economy entities employing from 10 to 49 persons conducting main activity classified according to PKD to sections B, C, D, E: representative population - 25% sample.

National economy entities employing at least 10 persons conducting main activity classified according to PKD to sections H, J, K or divisions 46, 71, 72, 73: representative population - 25% sample.

Selected national economy entities belonging to enterprise groups according to Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019: representative population – about 15% sample.

Objective scope

The objective scope of the survey on innovations in enterprises is based on the survey conducted within the international survey programme the Community Innovation Survey (CIS) for which Eurostat supported by a group of experts prepares a model questionnaire (Harmonised Data Collection for the CIS - HDC). In order to ensure international comparability of data, Eurostat also prepares methodological guidelines and explanations for selected issues. Both a model questionnaire and described documents are based on the Oslo Manual guidelines. CIS survey rounds take place every two years (always for even years) and their mandatory objective scope is regulated by the Commission implementing regulation (currently 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, OJ L 176, 1.7.2022, p. 10). Apart from mandatory questions which cover the most important issues concerning innovation activities, a model questionnaire also includes questions for which providing answers and transferring data by countries is voluntary. Variables

included in the Eurostat model questionnaire can be defined as follows:

- mandatory variables – the most important variables providing information on innovation activities,
- voluntary variables, but very important (according to the assignment in the HDC) – these are usually thematic modules proposed by the European Commission as its priorities (e.g. the impact of climate change or the COVID-19 situation on business activities), or topics surveyed periodically within the CIS framework (e.g. innovations with environmental benefits, barriers to innovation activities),
- voluntary variables, important (according to the assignment in the HDC)– this group of variables often includes specifying questions, mainly those known to be difficult to obtain, especially in smaller countries (e.g. exchange of activities within an enterprise group).

The compilation of themes surveyed in all CIS rounds prepared by Eurostat is available at the following link: https://ec.europa.eu/eurostat/cache/website/cis/library.html.

Poland implements the complete CIS model questionnaire to the survey Innovations.

In addition to the themes included in the Eurostat model questionnaire, the survey Innovations also collects data only for domestic purposes. These include, among others:

- revenues from sales of goods and revenues from sales of new and improved goods (only in industrial enterprises),
- sources of financing expenditures on innovation activities,
- share of exports in revenues from sales of new and improved products,
- cluster co-operation or other formalised forms of co-operation.

Some issues, also for domestic purposes, are surveyed in greater detail than in the CIS questionnaire, for example:

- type of entities developing innovations,
- intellectual property protection.

Up to the 2020-2022 wave, the innovation activities survey was conducted in between CIS survey rounds to meet domestic information needs (from odd-numbered years). Its objective scope was shortened compared to the one implemented within the CIS, but it included all the most important variables from the perspective of analysing innovation activities. As a result, in each wave of the survey, whether conducted within the CIS or in a shortened version for domestic purposes, the following topics have been surveyed in recent years:

- since 2018 product innovations in business processes (previously process, organisational, and marketing innovations), as well as discontinued, abandoned, or unfinished innovation activities,
- net revenues from sales of products, goods, and materials, as well as net revenues from sales of new or improved products,
- revenues from sales of goods and revenues from sales of new and improved goods,
- expenditure on innovation activities,
- public support,
- co-operation in innovation activities and within cluster initiatives,
- intellectual property protection.

A detailed list of themes collected within the survey for the years 2008-2024, both in domestic waves and those extended for CIS purposes, can be found in Appendix 1.

Starting with the 2020-2022 wave, the frequency of the survey Innovations has changed from annual to biennial, meaning it will only be conducted within CIS rounds. This has change enabled the introduction of a new questionnaire gathering data on an issue not surveyed extensively by official statistics (SSI-04 – Use of advanced technologies in industry).

2. Survey type and method

Data on innovation activities are collected through a mandatory survey, partially conducted as a full-scale survey as well as on the representative sample. Data are collected using the dataset PNT-02 –Survey on innovations. The statistical population (frame) is determined from the Statistical Units Database (BJS) on the basis of a specific algorithm for selecting entities, based on features described in detail under the section "Subjective scope".

The PNT-02 survey for the years 2020-2022 was conducted for the first time with the population ensuring data presentation for a statistical unit "enterprise" in accordance with Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019 and Commission Implementing Regulation (EU) 2022/1092 of 30 June 2022. Therefore, it covered an additional population: "selected entities of the national economy belonging to enterprise groups" according to the Statistical Survey Program of Official Statistics for 2022. This means that data from the PNT-02 survey for the years 2020-2022 will be presented in international data sources (Eurostat, OECD) for a statistical unit "enterprise", that is, differently than national data where a legal entity remains a basic observation unit (regional data from the 2020-2022 wave which in mentioned sources will be presented for legal entities will be an exception). This approach required a two-stage sample selection process.

STAGE 1 – drawing a sample for industry and services under the previous rules:

- **industry**

The PNT-02 survey in industry covers about 15000 units.

Units from section D (employing at least 49 persons), divisions including up to 50 units: 05, 07, 12, 19, 21, 39, and the public sector are fully included in the sample.

Units from the public sector are fully selected due to the potential need for analysing results according to the ownership sector. They make up a very small portion of the surveyed population. Therefore, these units are fully included in the sample. Divisions 36 and 37 are an exception as they include many units from the public sector and are subject to drawing.

The remaining part of the sample is allocated by breakdowns: division x sector. The sample allocation uses the results from the previous survey to estimate the variance of the most important characteristics within strata. Variance for determined key characteristics is estimated using standard statistical procedures. Estimated values are then used for optimal allocation of the sample for the new survey edition. As a result, a larger sample size is allocated to categories with higher variability of a surveyed characteristic, which improves the precision of the survey results in the following year. This approach is effective under the natural assumption that the distribution of surveyed characteristics remains similar across consecutive years.

A simple random sample is drawn without replacement, independently within strata, on the basis of a determined allocation..

- **services**

The survey PNT-02 in service enterprises covers about 6300 units.

Units from the public sector as well as units with more than 249 persons employed from breakdowns size class x division in which there are up to 50 units are fully included in the sample. Public sector units are selected in full due to the potential need for analysing results according to the ownership sector. These units make up a very small portion of the surveyed population. Therefore, they are fully included in the sample. The remaining part of the sample is allocated in strata: division x size class (by the number of persons employed: 1 – for 10-49 persons employed; 2 – for 50-249). The sample allocation uses the results from the previous survey to estimate the variance of the most important characteristics within strata. Variance for determined key characteristics is estimated using standard statistical procedures. Estimated values are then used for optimal allocation of the sample for the new survey edition. As a result, a larger sample size is allocated to categories with higher variability of a surveyed characteristic, which improves the precision of the survey results in the following year. This approach is effective under the natural assumption that the distribution of surveyed characteristics remains similar across consecutive years.

A simple random sample is drawn without replacement, independently within strata, on the basis of a determined allocation.

STAGE 2 – selecting units ensuring data presentation for a statistical unit "enterprise":

- removing all units with PKD outside the scope of the Survey on innovations from the datasets with enterprise groups (profiling conducted by employees of Statistics Poland),
- modification of the variable "the number of legal entities within the statistical unit enterprise" by adjusting it to the new state,
- selecting groups from the dataset with enterprise groups from which at least one unit was drawn,
- creating a list of all units from drawn groups which employ at least 10 persons or belong to divisions 21, 26, 30, 58, 59, 60, 61, 62, 63, 72 (these divisions are considered potentially innovative),
- additional units are not included in the basic survey for domestic needs,
- weights from drawing are determined for enterprise groups which are the reversal of likelihood of drawing a given group taking into account that a group is selected when at least one unit from the group is drawn.

As a result of completing described steps, a final list of entities selected for the survey is created. It is then uploaded and supplemented using the File Generator [3] with the necessary attributes for data processing at all stages of the survey as well as for calculating output data.

Generalisation of results

Indicators obtained from the representative survey should characterise the entire population. Therefore, data collected from respondents undergo a generalisation procedure using weights assigned to each unit in the sample. Generalisations apply to all variables in the survey. Classical estimators resulting from the stratified sampling scheme are used. Base (primary) weights are derived from the allocation adopted in the stratified sampling scheme. To obtain the final weights, the original weights are adjusted to account for non-response and information on the reasons for not obtaining answers from some sampled units.

The following algorithm is used to determine weights for generalisation: taking into account information regarding survey participation for the whole sample the so-called adjustment factors for sampling weights are determined for the whole sample at the level of appropriate breakdowns. The adjusting multiplier is calculated for every breakdown using the formula:

$$mk = \frac{N_1 + N_2 + N_3 \frac{N_1 + N_2}{N - N_3}}{N_1}$$

where:

N – weighted size of the selected sample, $N = N_1 + N_2 + N_3 + N_4$,
N_1 – wweighted size of the surveyed sample,
N_2 – weighted number of units that refused to fill in the questionnaire,
N_2 – weighted number of units with which there was no contact,
N_4 – weighted number of units outside the surveyed population.

Original weights, derived from the sampling process, are used for weighting in the formula. The adjusting multiplier constitutes the estimation of the proportion of units that should have been surveyed relative to the number of units actually surveyed in a given stratum. All cases of refusals and a proportional part of the cases with no contact are included in the group of units belonging to the population of interest. The final weight is obtained by multiplying the original weight by the adjusting multiplier.

Results of representative surveys are always subject to some sampling errors. However, well designed and conducted representative survey accurately describes the analysed population and a sampling error does not have a significant impact on the quality of such survey with appropriate sample size. Issues concerning data quality are discussed in more detail under the section "Survey quality assessment."

3 An application used to prepare a survey file allowing preliminary selection of units and assigning to them attributes required during survey implementation and data processing.

3. Data gathering tools/data sources

A basic tool for gathering data within the survey Innovations is the questionnaire PNT-02 Survey on innovations. National economy entities covered by a reporting obligation are required to submit data in an electronic form via the Reporting Portal of Statistics Poland which enables filling in questionnaires on-line (Computer Assisted Web Interview method – CAWI). Logging in is possible via an account activated previously. The procedure of setting up an account is described in the Guide to electronic reporting available on the Reporting Portal website: https://form.stat.gov.pl/formularze/przewodnik/.

In exceptional situations, it is possible to fill in and submit the questionnaire in a paper form. Additionally, respondents can fulfil their reporting obligation by providing necessary information to a designated employee of the Statistical Office during a telephone interview.

Electronic questionnaires are a representation of the PNT-02 data set specified in the Statistical Survey Program of Official Statistics for a given year. An electronic version of the questionnaire on the Reporting Portal enables logical and calculating control of data entered into questionnaires as well as controlling coherence between its sections.

Before an electronic questionnaire is made available on the Reporting Portal, it undergoes testing. Testing is based on evaluating the usability of an application and checking the accuracy of implemented validation rules ensuring logical and calculating control of data entered by respondents. Validation rules are developed by a team of co-ordinators before developing an application. Due to the changing objective scope of the survey in each wave, these rules must be thoroughly verified before each new wave as a properly functioning application is crucial for collecting high-quality data.

Mechanisms for logical linking of questions have been applied allowing for automatic data completion based on previously provided answers to reduce the burden on respondents. In the event of errors, inconsistencies, or incorrect answers given by respondents, an appropriate message is displayed indicating where data need to be verified. Two types of errors can be distinguished, namely absolute errors which do not allow accepting a questionnaire and discretionary errors which are informative only and do not block such possibility. In the case of absolute errors, data should be corrected or a respondent should reach out to a contact person to clarify an error and accept a questionnaire. Accepting data on the Reporting Portal means meeting a reporting obligation by an entity

Depending on the type of question, answers are given via:

- ticking a correct answer, e.g. in yes/no questions,
- providing a numeric value in a box in questions concerning, i.a. the value of expenditures or revenues,
- selecting a correct answer from a list – from a so-called "glossary".

The model questionnaire PNT-02 for the years 2022-2024 constitutes Annex no. 2 to the following publication and is available on the website: https://form.stat.gov.pl/formularze/2025/passive/PNT-02.pdf

After closing a survey edition on the Reporting Portal, further works are conducted in IT system of the survey. It has functionalities for searching, filtering, and generating reports. These allow for analysing the completeness and consistency of a dataset, as well as detecting cases that deviate from an expected correct situation. Quick error diagnosis enables the immediate implementation of corrective actions. Most often, it is necessary to contact respondents to obtain clarifications or make corrections to a submitted questionnaire.

4. Variables used in the survey

4.1. Main variables

The variables from the survey Innovations which appear in every survey edition and most frequently appearing in publications and databases as well as receiving the greatest attention from domestic and foreign recipients are variables concerning:

- conducted innovation activities,
- type of implemented innovations,
- using tax reliefs,
- co-operation with other enterprises or institutions,
- public support,
- expenditures on innovation activities by type and source of funding,
- revenues from sales of products, goods, and materials (net),
- net revenues from sales of new or improved products,
- net revenues from sales of goods,
- net revenues from sales of new or improved goods,
- number of persons employed,
- number of submitted applications and granted intellectual property rights.

A wide range of data collected with the use of PNT-02 questionnaire allows providing comprehensive information on innovation activities of enterprises in Poland to users.

A detailed list of variables is included in Annex 3 and is also available on the website:
https://form.stat.gov.pl/formaty/zmienne-zestaw.php?rok-pbssp=2024&rok-p=2025&idzst=339

A name of package defines a group of basic variables characterising a specific thematic area with a similar subject matter, regardless of the object of observation.

A detailed list of variables is a standardised list generated and published for each survey, although not all elements of the description are always presented for each variable (depending on, among others, the type of variable)

4.2. Measures, indicators and calculating methods

The results of innovations survey are presented as:

1. figures – e.g. expenditures on innovation activities (in thousand PLN) are most frequently presented in this way,
2. structure – e.g. "expenditures on innovation activities" by a territorial breakdown (for NUTS 2 regions where Poland=100) are presented using a structure,
3. share – examples of presenting results as share include:
   - the share of revenues from sales of new or improved products (total, for export, new or significantly improved for the market and enterprise) in revenues from sales of products, goods and materials in total,
   - the share of revenues from sales of new or improved goods in revenues from sales of new and significantly improved products.
   - the share of innovative enterprises in total number of enterprises,
   - the share of enterprises co-operating in the field of R&D or other innovation activity with other entities or institutions in the total number of enterprises.
   - the share of innovation active enterprises which co-operated with other enterprises or institutions in the field of R&D/ other innovation activities in the number of innovation active enterprises,
   - the share of enterprises which co-operated with other enterprises or institutions within a cluster initiative or participated in other than cluster formalised co-operation in the number of enterprises which co-operated with other enterprises or institutions.

4.3. Definitions of key terms

Biotechnology – an interdisciplinary field dealing with the application of science and technology to living organisms, as well as parts, products and models thereof, to alter living or non-living materials for the production of knowledge, goods and services.

Research and experimental development (R&D) – creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of mankind, culture and society – and to devise new applications of available knowledge. In order to consider an activity as R&D, it must meet the following five main criteria:

1. novel – aimed at new findings,
2. creative – based on original, not obvious, concepts and hypotheses,
3. uncertain – uncertain about the final outcome,
4. systematic – planned and budgeted (the aim of the R&D project and the sources of funds must be defined),
5. transferable and/or reproducible – leading to results that could be possibly reproduced.

Research and experimental development includes: scientific research (basic and applied research) and experimental development.

Innovation activity – includes all developmental, financial and commercial activities undertaken by an enterprise that are intended to result in an innovation for the enterprise. It also includes conducted research and experimental development (R&D), regardless of its objective. Innovation activities can result in an innovation, be ongoing, postponed or abandoned.

Enterprise group – enterprises that have legal autonomy, but bound economically due to the controlling and/or ownership links between them. The links between the parent unit and its subsidiaries can be identified within the group.

Innovation – the implementation of a new or improved product (good or service), or business process (or combination thereof) that differs significantly from products previously introduced on the market or processes applied in the enterprise.

Product innovation – a new or improved good or service that differs significantly from the enterprise's previous goods or services and that has been introduced on the market. Product innovations must provide significant improvements to one or more characteristics or performance specifications.

Business process innovation – a new or improved business process for one or more business functions that differs significantly from the enterprise's previous business processes and that has been brought into use by the enterprise.

Innovation with environmental benefits – a new or improved product or process of an enterprise that generates lower environmental impacts, compared to the enterprise's previous products or processes, and that has been made available to potential users or brought into use. The environmental benefits may be a primary objective of an innovation or a result of other objectives. They may occur during the production of a good or service, or during its consumption or use by the end user of a product (an individual, another enterprise, the government, etc.).

Know-how – all information, that is, expertise and experience in technology and manufacturing process for a given good. This information is:

- secret, that is to say, not generally known or easily accessible,
- substantial, that is to say, significant and useful for the production of the contract products,
- identified, that is to say, described in a sufficiently comprehensive manner so as to make it possible to verify that it fulfils the criteria of secrecy and substantiality.

Licence – the acquisition of rights to use external scientific and technical solutions or expertise in manufacturing:

- protected in whole or in part by exclusive rights (patents in the case of inventions, rights of protection in the case of utility models, etc.),
- not protected by exclusive rights: invention projects, results of research, experimental development, construction, design and organisational works, means and methods of specialised studies, tests and measurements, expertise and know-how in production as well as results of works developing the licenced work.

Production methods – technologies, devices and software used for production (manufacturing) of goods and services.

Expenditures on innovation activities – economic cost of innovation activities undertaken by an enterprise. Expenditures can be intramural (activities carried out in-house) or extramural (carried out by third parties on behalf of an enterprise).

Nanotechnology – understanding and control of matter and processes at the nanoscale typically but not exclusively below 100 nanometres in one or more dimensions where the onset of size-dependent phenomena usually enables novel applications utilising the properties of nanoscale materials that differ from the properties of individual atom molecules to create improved materials, devices and systems that exploit these new properties

Patent – the exclusive right to use an invention for commercial or professional purposes within a territory of a given country. In Poland it is granted by the Patent Office of the Republic of Poland, while a European patent – by the European Patent Office. A right is granted to a natural or legal person for the exclusive use of an invention in a specified territory for 20 years from the date of filling a patent application, under conditions specified by the laws of a respective country or an international convention. A supplementary patent is a patent for an improvement or supplement to an invention that has features of an invention but cannot be used on its own.

Oslo Manual – an international methodological manual on statistical surveys on technical (technological) innovations, the third in chronological order from the series known as the Frascati Family Manuals. It was first published in 1992 and has been periodically updated. Its latest, fourth edition from 2018 includes a broader range of phenomena related to innovations compared to earlier versions and experience gained during recent rounds of innovation surveys in the OECD countries as well as in partner economies and organisations.

Enterprise– in accordance with Regulation (EU) 2019/2152 of the European Parliament and of the Council of 27 November 2019, Article 1(a) and 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 – 'is the smallest combination of legal units, that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its current resources. An enterprise carries out one or more activities at one or more locations. An enterprise may be a sole legal unit.'

Innovation-active enterprise – an enterprise engaged at some time during the observation period in one or more activities to develop or implement new or improved products or business processes for an intended use. It also includes enterprises conducting research and experimental development (R&D), regardless of its purpose.

Innovative enterprise – an enterprise reporting implementation of one or more innovations within the observation period.

Net revenues from sales of products, goods and materials – net revenues from domestic and export sales of products (finished, semi-finished products and services) manufactured by the unit together with packaging, equipment and third party services if invoiced along with products to customers; sales of goods and materials, i.e. tangible current assets purchased for resale in the same condition as received and products manufactured by the unit if they are sold in a chain of own stores along with the third-party goods, as well as amounts due for goods and materials sold regardless whether or not they have been paid.

Intellectual property – industrial property and the copyright (including protection of databases or know-how).

Industrial property – industrial property includes: trademarks, industrial designs, inventions, etc.

Cluster initiative co-operation – the term "cluster initiative" refers to formal cooperative links established, for example, on the basis of a letter of intent, an association agreement, a consortium establishing agreement, etc.

Co-operation in innovation activities – active participation in joint innovation projects with other entities. These can include other enterprises or non-commercial institutions. Only outsourcing work without active collaboration is not considered co-operation.

Invention – the object of protection for which a patent may be granted; a technical solution is considered an invention.

Industrial design – a new appearance of a whole product or part thereof and having individual character resulting from the features of, in particular, the lines, contours, shapes, colours, texture or materials of the product and its ornamentation. An industrial design must meet the following criteria to obtain protection: it must concern the appearance of a whole product or part thereof, must be new, and must have individual character.

Utility model – a technical solution concerning the shape or construction of an object with a permanent form or an object with a permanent form consisting of functionally linked parts.

Trademark – any marking capable of distinguishing goods or services of one entity from the similar ones of another. A protection right can be granted for a trademark. Granted protection rights are registered in a trademark register.

5. Organisation and management of survey implementation

The Statistical Office in Szczecin is the author unit implementing the Survey on innovations. Employees of the Centre for Science, Technology, Innovation and Information Society Statistics, who are responsible for organisation of the survey implementation as well as compilation, analysis, and presentation of results, make up a co-ordinating team. The team's tasks also involve improving the survey methodology, especially adapting it to the methodology presented in the Oslo Manual 2018: Guidelines for Collecting, Reporting and Using Data on Innovation, 4th Edition, The Measurement of Scientific, Technological and Innovation Activities, by OECD/ Eurostat, 2018. In order to ensure international comparability of gathered data, co-ordinators take part in meetings organised by Eurostat and the OECD as well as co-operate with these institutions during the development of additional guidelines related to the survey methodology.

Main tasks of co-ordinators include:

- preparing assumptions for sampling units,
- preparing the survey schedule,
- verification of units participating in the survey,
- preparing a model questionnaire for the survey,
- preparing assumptions for logical and calculating control of the questionnaire,
- preparing mock-ups of output tables together with algorithms for their calculation,
- allocating tasks related to the implementation of the survey,
- supervision over the course of the survey (i.a. on-going clarification of doubts reported by statisticians or reporting units),
- controlling correctness of datasets,
- analysing output tables,
- preparing and transferring data for publications and databases of Statistics Poland,
- co-operation with international institutions (Eurostat and the OECD),
- preparing data for Eurostat and the OECD,
- on-going monitoring of issues related to innovation activities,
- analysis of government and strategic documents.

Survey co-ordinators closely co-operate with a team of programmers from the Data Engineering Centre in the Statistical Office in Szczecin. The Centre supports processing of data collected from respondents and contributes to their effective verification and analysis by providing, i.a. reports controlling correctness of data.

The tasks of the team from the Data Engineering Centre include, i.a. developing IT system of the survey and creating new functionalities which can streamline everyday work of statisticians and co-ordinators. Additionally, the Centre is also responsible for supporting an application PNT units facilitating comprehensive compilation of all information regarding a given reporting unit held by the Centre for Science, Technology, Innovation and Information Society Statistics.

Statisticians, who are employees of the Statistical Office in Szczecin as well as its branches in Stargard and Koszalin, are responsible for direct contact with respondents. Their tasks also include registering paper questionnaires in IT system of the survey as well as sending paper based correspondence, that is sending reminders about a reporting obligation.

Implementation of the surveys requires co-operation with other units of official statistics:

- the Statistical Computing Centre – responsible for developing a survey application on the Reporting Portal, supporting functionalities of the Reporting Portal (sending reminders to its users, e.g. about an imposed reporting obligation, impending date of fulfilling a reporting obligation),
- Department for Innovation - responsible for sampling and generalisation of results.

The survey is implemented in accordance with provisions of the Programme of Statistical Surveys of Official Statistic and adhering to ethics of a statistician, especially the principle of maintaining statistical confidentiality and protecting collected data – pursuant to the Act of 29 June 1995 on Official Statistics (Journal of Laws of 2024, item 1799).

6. Presentation of survey results

6.1. Forms of publishing results

Results of the Survey on innovation activities are presented in the first place in news release Innovation activities of enterprises in Poland published in October, in the same year when the survey is conducted (with data for the previous three years). A publication under the same title is published in December presenting a wide scope of data regarding the surveyed issues. A chapter dedicated to innovation activities is also included in an annual publication Science and technology. The publication Knowledge-based economy in Zachodniopomorskie Voivodship is published in June presenting, i.a. the results of the Survey on innovation activities in Poland and Zachodniopomorskie Voivodship. Results presented in publications concern, depending on a question, data from the previous year or three past years preceding the year in which the survey was conducted.

All forms of publishing results are available in an electronic version on the website of Statistics Poland
Statistics Poland / Topics / Science and Technology / Science and Technology

Additionally, publications are also available in Statistical Offices in a paper form.

Results of the Survey on innovation activities are also presented in the following databases:

1. Statistics Poland:
   - Local Data Bank (BDL) – data by areas, category: Science and technology. Information society, group: Innovation activities (https://bdl.stat.gov.pl/bdl/dane/podgrup/temat),
   - Macroeconomic Data Bank (BDM) – data category: annual, area: Research and experimental development, innovation activity of enterprises and information society (https://bdm.stat.gov.pl/),
   - Knowledge Databases (DBW) – category: Science and technology, group: Innovation activities (https://dbw.stat.gov.pl/en/baza-danych),
   - Strateg – thematic area: Research and innovation (https://strateg.stat.gov.pl/#/obszary-tematyczne),
   - SDG – thematic area: Industry, innovation and infrastructure (https://sdg.gov.pl/en/);
2. Eurostat – database by themes: Science, technology, digital society; Science and technology; Community innovation survey: https://ec.europa.eu/eurostat/web/main/data/database;
3. OECD – Business innovation statistics and indicators: https://www.oecd.org/en/data/datasets/business-innovation-statistics-and-indicators.html;

Data regarding innovation activities are also published in the following yearbooks:

- Statistical Yearbook of the Republic of Poland;
- Statistical Yearbook of Voivodships;
- Statistical Yearbook of Industry.

Yearbooks are available in an electronic form on the website: Statistics Poland / Topics / Statistical yearbooks.

The results of the Survey innovation activities are additionally presented in a leaflet 'Poland in figures' published on website of Statistics Poland in the thematic area: Other publications; Other aggregated publications (Statistics Poland / Topics / OthOther studies / Other Aggregated Studies).

Moreover, data are also published in social media (i.a. Facebook, X).

6.2. Breakdowns of presented data

As broad as possible scope of variables is selected for publication, taking into account statistical confidentiality. Data on innovation activities are presented by a number of breakdowns:

- territorial – this breakdown classifies data by: voivodships, macroregions (NUTS 1), regions (NUTS 2), and special aggregations (e.g. for Eastern Poland);
- ownership sectors – this classification results from the methodology of the REGON register and classifies national economy entities with regard to ownership rights:
  - public sector,
  - private sector;
- size classes – this breakdown is based on the number of persons employed in an entity and divides entities into the following classes:
  - 10–49 persons employed,
  - 50–249 persons employed,
  - over 249 persons employed;
- types of main activity according to the Polish Classification of Activities 2007 – in accordance with objective scope of the survey, for the Polish Classification of Activities divisions and sections;
- level of technology and selected levels of knowledge intensity – domains of the economic activity in the section Manufacturing with high R&D intensity are considered high technology. A list of high technology domains developed by the OECD was revised by Eurostat and the European Commission Joint Research Centre in 2008 as well as extended onto services on the basis of their knowledge intensity. Due to the fact that objective scope of the Survey on innovations does not include all divisions of the Polish Classification of Activities 2007 covered by a classification of knowledge intensity, it is not possible to present data for all levels of knowledge intensity. Therefore, data are only presented for levels with fully coherent scope of divisions of the Polish Classification of Activities 2007.

7. Survey quality assessment

An aim of the survey is providing information concerning innovation activities of enterprises in Poland. The main recipients of data are domestic users: ministries and central authorities, local authorities (government and local government institutions), entrepreneurs, employers, investors, producer associations, academic and educational institutions, researchers, students, financial and insurance institutions, media (press, radio, television), individual users, and internal users. Data users also include international organisations, such as Eurostat and the Organisation for Economic Co-operation and Development (OECD).

Efforts are made to provide the highest quality results. The risk of errors in a survey and discrepancies in data is mitigated due to extensive logical and calculating assumptions in an electronic questionnaire. Provided responses are analysed and verified against information provided in different questionnaires to the extent concerning innovation activities. If doubts related to correct filling in of the questionnaire arise, reporting units may reach out to a contact person for substantial issues who helps filling in a questionnaire correctly and explains methodological issues. Contact details of employees responsible for contact with reporting entities are available on the Reporting Portal in PNT-02 questionnaire and on the website of Statistics Poland https://form.stat.gov.pl/formularze/kontakt.htm.

Information provided by Marshal Offices concerning public support granted to enterprises for innovation activities within the framework of Regional Operational Programs constitute an additional source of data for verifying correctness of responses provided in the questionnaire.

The survey is implemented in accordance with the schedule and its results are published in accordance with the editorial title-plan.

Since the Survey on innovations is mainly conducted on a sample, it contains random errors. As the number of observations increases, so does the precision of the survey, which in turn increases the confidence that results accurately reflect reality. The measure of precision of results used in the PNT-02 survey is the relative standard error. Non-sampling errors include item non-responses and unit non-responses. Over-coverage errors arise when the survey file includes units that fall outside the survey scope or no longer exist (e.g. liquidated units, not removed from the sampling frame). The share of such units does not exceed 1% of all units in the survey file. Item non-responses pertain to various types of variables. The percentage of entities with missing responses for these variables does not exceed 5% of all enterprises fulfilling the reporting obligation. To minimise errors, missing data are initially obtained from other sources:

- the number of persons employed – from data collected by the Statistical Office in Bydgoszcz or the Base of Statistical Units,
- revenues from sales of products, goods, and materials – from F-01/I-01 or SP surveys,
- revenues from sales of goods (concerns only industrial enterprises) – from P-01 survey,
- R&D expenditures – from PNT-01 survey.

If necessary data are not available from the above mentioned sources, imputation is performed using the stratified hot-deck method. The percentage of records for which item imputation is applied does not exceed 1% of the final dataset size. Unit imputation (entire records) is not performed. The completeness of the survey exceeds 70% in each edition. To improve the survey completeness and timeliness, automated reminders are sent to reporting units via the Reporting Portal, along with email notifications reminding about reporting obligations. Units are also monitored by phone, and when contact cannot be established, reminder letters about the unmet reporting obligation are sent by mail.

For the survey editions 2020–2022, employees of the Statistical Office in Szczecin organised a webinar for reporting units on completing the PNT-02 Survey on innovations before the data collection began in order to enhance data quality. This webinar aimed to present the questionnaire, discuss its key elements and links, and address the most common errors. Additionally, a chat was hosted during the survey period where units could ask questions, and survey co-ordinators provided answers, thereby resolving issues related to filling in the questionnaire. Both virtual meeting formats were well received and will be continued in the future survey editions.

Burden on respondents taking part in the survey is also analysed each year. Two questions placed at the end of the questionnaire are used for this purpose – a reporting entity estimates time dedicated to filling in the questionnaire as well as time dedicated to collecting information necessary to fill in the questionnaire. In order to reduce respondent burden, mechanisms for automatic filling in data in logically related questions are used in an electronic questionnaire.

Presented survey results are comparable over time with previously published data regarding this scope and all possible methodological differences in presenting information are indicated when data are compared. Data can be also analysed in spatial terms on a national as well as international level due to implementation of guidelines resulting from the Oslo Manual 2018.

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Annexes

Annex 1. Objective scope

Annex 1. PNT-02 – Survey on innovations for the years 2022-2024

Annex 3. Detailed list of variables