



## METHODOLOGICAL EXPLANATION

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# USAGE OF INFORMATION- COMMUNICATION TECHNOLOGIES AND E-COMMERCE IN ENTERPRISES

This methodological explanation relates to the data releases:

- Digital Entrepreneurship (First Release)
- Web sales, Slovenia, annually (First Release)
- Digital Entrepreneurship, detailed data, Slovenia, annually (Electronic Release)



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## 1 PURPOSE

The purpose of publishing the data is to present to what extent enterprises with 10 or more employees and self-employed use information-communication technologies (ICT), sell or buy via websites or through computer data exchange, i.e. degree of digitisation of enterprises.

## 2 LEGAL FRAMEWORK

- [Annual Programme of Statistical Surveys \(LPSR\)](#) (only in Slovene)
- [National Statistics Act](#) (OJ RS, No. 45/95 and 9/01)
- [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 \(CELEX: 32019R2152\)](#)
- [Implementing regulations \(EU\) for individual years](#)

## 3 UNIT DESCRIBED BY THE PUBLISHED DATA

The unit described by the published data is an enterprise with 10 or more employees and self-employed which is registered on the territory of the Republic of Slovenia and registered in one of the activities of the Standard Classification of Activities SKD 2008 (i.e. NACE Rev. 2) from sections C to N.

## 4 SELECTION OF OBSERVATION UNIT

Enterprises are monitored by size, by the number of employees and self-employed and by activity according to the Standard Classification of Activities SKD 2008.

The observation unit is an enterprise with 10 or more employees and self-employed. The observation units are selected on the basis of the threshold, i.e. enterprises with 10 or more employees and self-employed registered on the territory of the Republic of Slovenia and registered in one of the activities of the Standard Classification of Activities SKD 2008:

- Manufacturing (C),
- Electricity, gas, steam and air conditioning supply (D),
- Water supply, sewerage, waste management and remediation activities (E), Construction (F),
- Wholesale and retail trade, repair of motor vehicles and motorcycles (G), Transportation and storage (H),
- Accommodation and food service activities (I),
- Information and communication (J),
- Real estate (L),

- Professional, scientific and technical activities (M),
- Administrative and support service activities (N)
- Repair of computers and consumer goods (95.1).

The survey covers a part of the target population on the basis of which we make conclusions about the scope of the usage of information-communication technologies (ICT) and e-commerce of the entire population. The basis for the sampling frame is the Business Register of Enterprises (PRS).

The sample is stratified. As the stratification variables the size of the enterprise and the activity in which the enterprise is registered are used.

Annually about 1,800 observation units are included in the survey.

## 5 SOURCES AND METHODS OF DATA COLLECTION

Data are collected annually.

Data are collected with the annual survey "Usage of information-communication technologies (ICT) in enterprises" (IKT-PODJ). From 2004 on, the data are collected with the questionnaire "Usage of information-communication technologies (ICT) in enterprises" (IKT-PODJ). Every year the content of the survey and the questionnaire have an emphasis on a specific topic from the field of digitisation of enterprises.

Year	Content of specific module
2007	E-skills
2008	E-business
2009	E-commerce
2010	ICT security
2011	E-government usage and ICT usage and environmental impact
2012	Mobile connection to the Internet for business use
2013	Usage of social media
2014	Purchase of cloud computing services
2015	Usage of social media and ICT security
2016	Big data analysis
2017	Usage of social media and e-commerce
2018	Big data analysis, usage of robotics and 3D printing
2019	ICT security
2020	Big data analysis, usage of robotics and 3D printing
2021	Usage of artificial intelligence technologies
2022	ICT security

Data are collected with a web questionnaire. The data refer to the current state (e.g. whether the enterprise has a website, etc.) and the previous year (e.g. the value of turnover generated via web sales, etc.).

Data for the survey are not obtained from administrative sources.

## 6 DEFINITIONS

**Enterprises** are registered legal or natural persons which had turnover or employees or investment and were therefore active during at least a part of the reference period. An enterprise may consist of several ownership-related legal entities, as long as they operate on the market as one independent enterprise.

**ICT (information-communication technologies)** is hardware and software (computers, mobile phones, Internet, operational system, computer software, mobile applications, etc.) that enable collection, storage, usage and transmission of data.

**ICT skills** are capabilities enabling the effective use of common or advanced software tools (computers, computer programs, Internet).

**ICT or IT specialists** are employees for whom the main job is to develop ICT, operate or maintain ICT systems or applications.

**Automated data exchange between the enterprise and other ICT systems outside the enterprise** is used for the exchange of messages (e.g. orders, invoices, payment transactions or description of goods) via the Internet or other computer networks in an agreed format which allows for its automated processing (e.g. XML, EDIFACT, etc.). Manually typed individual messages are excluded.

**E-commerce** includes business transactions between enterprises (B2B), between enterprises and customers (B2C), and between enterprises and government (B2G). In a narrow sense it means selling or buying of goods and services over the websites or via electronic interchange of data (EDI).

**Web sales** include the sale of products or services, receipt of reservations, orders via a website (e.g. via order forms on own online store, e-marketplaces, mobile applications) or via extranets. This does not necessarily mean that the payment or delivery is done via a website. The order or reservations received by regular e-mail are not included.

**EDI (Electronic Data Interchange)** is used for the electronic interchange of data, documents and orders inside the enterprise (e.g. branches) and between the enterprises. Data interchange flows are automated between the computer systems between partners in standard and encrypted form (e.g. EDI, EDIFACT, ODETTE, TRADACOMS, XML, xCBL, cXLM, and ebXML).

**Sales via electronic data interchange EDI** include the receipt of orders in an agreed standardized format (e.g. XML, EDIFACT, UBL, etc.), which enables their automated processing. Sales take place between computer systems of enterprises or within an enterprise group. Individual messages are not entered manually.

**Sharing information electronically on Supply Chain Management** means exchanging all types of information with enterprises – either suppliers or

customers –on the availability, production, development and distribution of goods or services. This information may be exchanged via websites, networks or other means of electronic data transfer, excluding e-mails not suitable for automated processing or manually typed.

**Automated sharing of information within the enterprise** means any of the following: usage of one single software application to support the different functions of the enterprise (e.g. SAP); data linking between the software applications that support the different functions of the enterprise; usage of a common database or data warehouse accessed by the software applications that support the different functions of the enterprise.

**ERP** – Enterprise Resource Planning is a software application that integrates and stores data from different business functions. ERP integrates enterprise departments, the majority of the business process (e.g. planning, procurement, sales, marketing, customer relationship, finance and human resources).

**CRM – Customer Relationship Management** enables access to key information regarding customers. It allows to capture, store and make available to other business functions the information about their clients and to make analyses of the information on clients for marketing purposes (e.g. setting prices, making sales promotion).

**Electronic invoice (e-invoice)** is an electronic transaction document that contains information about an invoice. Electronic invoices can be:

- e-invoices or an electronic invoice in a standard structure suitable for automated processing, e.g. XML (e-slog 1.6), EDI, etc. They are exchanged either directly between partners via service operators of e-invoices or via an electronic banking system.
- invoices in electronic form not suitable for automated processing (e.g. e-mails, e-mail attachment as PDF, images in TIF, JPEG or other formats).

**Cloud computing services** – purchase of ICT services that are used over the Internet to access software, storage capacity, computing power, etc. The purchased services have all of the following characteristics:

- are delivered from servers of service providers,
- can be easily scaled up or down (e.g. the number of users or change of storage capacity),
- can be used on-demand by the user, at least after the initial set up (without human interaction with the service provider),
- are paid for, either per user, by capacity used, or they are pre-paid.

Cloud computing services are delivered from shared servers of service providers (public cloud) or from servers of service providers exclusively reserved for the enterprise (private cloud). Cloud computing may include connections via Virtual Private Networks (VPN).

**Big data** are generated from activities that are carried out electronically and from machine-to-machine communications (e.g. data produced from social media activities, from production processes, etc.) Big data typically have characteristics such as:

- significant volume referring to vast amounts of data generated over time;
- variety referring to the different format of complex data, either structured or unstructured (e.g. text, video, images, voice, docs, sensor data, activity logs, click streams, coordinates, etc.);
- velocity, referring to the high speed at which data are generated, becomes available and changes over time.

**The big data analysis** refers to the use of techniques, technologies and software tools for analysing big data extracted from your own enterprise's data sources or other data sources.

**Radio Frequency Identification Technologies (RFID)** are automatic identification methods to store and remotely retrieve data using RFID tags or transponders. A RFID tag is a device that can be applied to or incorporated into a product or object and can transmit data via radio waves (on the product/object there is attached a transponder that sends data via radio waves to the 'rider of the data').

**ICT security** – measures, controls and procedures applied on ICT systems in order to ensure integrity, authenticity, availability and confidentiality of data and systems.

**ICT security monitoring system** allows to detect suspicious activity in the ICT systems and alerts the enterprise about it, e.g. Intrusion Detection/Prevention Systems (IDS/IPS), next-generation firewalls (NGFW), advanced systems for preventing intrusions into systems (Next Generation Intrusion Prevention System – NGIPS). The use of stand-alone anti-virus software is excluded.

**A strategy for the safe usage of information-communication technologies (ICT)** – its purpose is to assess the potential security risks of the ICT usage (computers, computer programs, the Internet, etc.) and to anticipate security procedures, controls or measures to ensure the integrity, availability and confidentiality of enterprise data and ICT systems. If an external provider provides for enterprise ICT, which has a formally defined strategy for safe usage of ICT, and this is implemented in other enterprises then it is considered that the enterprise has a formally defined strategy for safe usage of ICT.

**Document(s) on measures, practices or procedures on ICT security** – documents on the safe use of ICT and on data confidentiality: they contain information on how employees should be trained for the safe use of ICT, for the use of security measures or procedures, for the implementation of procedures for the evaluation of the security measures or procedures used, plans for updating documents related to the safe use of ICT, etc.

**DDoS – Denial-of-Service-attack** – is an external attack that disables the usage of the information system for users. The server or network is saturated, loaded with so many requests that it cannot process them, and may be temporarily disabled due to overload.

**An unforeseen event** – an error on hardware or software, unauthorized access to enterprise ICT.

**Phishing attack** is an attempt to retrieve information such as passwords, usernames, and e.g. information on credit cards via an e-mail that directs the user to false websites.

**Pharming attack** is direct attacks on the DNS server or on a host file that is located on a user's computer. Without even knowing it, the users are redirected to false websites, although they have entered the URL of the website that they wanted to visit in the address bar of the browser. Since these false websites are mostly complete copies of the original website, users do not notice that they are located on a false address and unintentionally provide their personal information to the false website.

**Ransomware attack** is an attack in which malicious software encrypts data on a computer or network. This prevents the users from using them. The users regain access to them when they pay a certain amount (ransom).

**Internet of things** refers to interconnected devices or systems that collect and exchange data and can be monitored or remotely controlled via the Internet. Examples are:

- Smart thermostats, smart lamps, smart meters
- Smart alarm systems, smart smoke detectors
- Sensors, RFID tags that operate based on radio frequency identification technology and are connected to a base station through which they can be monitored or operated via the Internet

Also included are devices or systems connected via Bluetooth, internal networks, e.g. virtual private networks (VPNs).

**Collaboration tools to support teamwork** are tools that enable collaboration, teamwork on documents, communication between employees (e.g. MS Teams, where ideas can be exchanged, stored or shared in one place), video communication applications and instant messaging between employees or business partners (e.g. via Skype, Slack, Google Chat), usage of a Wiki program that allows creation, editing.

**A document system is an information system** whose task is to manage documents in electronic form and control their path from creation to archiving.

**BPM (Business Process Management)** is an information system for managing business processes and documents in one system.

**Digital strategy for business transformation of the enterprise** is a document approved by the management (can be part of a business strategy or a stand-alone document) and contains most of the following elements: comprehensive customer relationship management, data strategy, business strategy processes and digital solutions, digital business models, products and services, development of digital staff and jobs, development of digital culture, and cyber security and industry 4.0.

**Internet connections:**

**Broadband fixed Internet connections** enable fast data transfer over the Internet. In general, this bandwidth is greater than 2 Mbit/s. Broadband fixed internet connections are:

- xDSL (Digital Subscriber Line) or XDSL technology uses conventional copper phone pairs. DSL technology covers several versions, such as ADSL, VDSL, HDSL, etc. These technologies are designed to increase the bandwidth of conventional copper telephone wires. The speed of data transfer depends on the distance of the home or enterprise from the telephone company's head office offering the DSL service.
- Cable Internet is a technology and service that uses the existing TV network (consisting of coaxial cable connections that transmit a television signal to TV sets) to transfer data from the Internet to a selected computer at extremely high speed. To access the Internet through the cable system, a cable modem is needed.
- Optical fiber enables faster transfer of data in the form of pulses or light. The data transfer rate is somewhere between 10 Mb/s and up to 1 Gb/s and more.

**Broadband mobile Internet connections (wireless connections)** allow connection to the Internet without wire (infrared, microwave, satellite, laser connection, wimax). The Wireless Internet connection via a mobile phone, portable or tablet computer, and other mobile devices, is carried out using third generation mobile connections (3G), e.g. UMTS, HSDPA, HSUPA, HSPA+ or fourth generation (4G), e.g. LTE.

**Social media** – are a set of Internet 2.0 technologies that enable interactive information sharing, interoperability and user-oriented design. Social media include: social networks, blogs or microblogs, websites for sharing multimedia content and tools for sharing knowledge based on Wiki. Enterprises use them, e.g. Facebook, Twitter, YouTube, etc., for linking, creating or exchanging content, information over the Internet, with customers, suppliers, partners or within an enterprise among persons employed. The enterprise uses social media if it has a user profile, account or license according to the requirements and type of social media.

**Open Source software** refers to computer software under an open source license. It allows for modification, redistribution of the program.

**Use of 3D printing** aka additive layer manufacturing enables with the usage of special printers production of 3-dimensional objects with applying sequential layers of different materials.

**An industrial robot** is an automatically controlled, reprogrammable, multipurpose manipulator programmable in three or more axes, which may be either fixed in place or mobile for use. Most industrial robots are based on a robotic arm and a series of links and joints with an end effector that carries out the task. The usage of CNC-machines, 3D printers and devices that are fully controlled by an operator is excluded.

**A service robot** has a degree of autonomy and can operate in complex and dynamic environments that may require interaction with persons, objects or other devices. They use wheels or legs to achieve mobility and are often used

in inspection, transport or maintenance tasks. The usage of software robots is excluded.

**Artificial intelligence** can only be:

- Software for data analysis based on machine learning, e.g. for inventory or supply optimization, sales forecasting, predictive maintenance
- A system for recognizing faces, images, documents or products based on computer vision or a speech recognition system
- A chatbot or a virtual business assistant based on technology that generates written or spoken language
- Machine translation software

Artificial intelligence can be built into a device, e.g.:

- Autonomous robot for automating activities in the warehouse or during assembly work
- Autonomous drone to control the production or handling of packages, etc.

Technologies of artificial technologies are:

- **Technologies identifying objects or persons based on images**, e.g. image, fingerprint, face, object, video. Examples of such technology are computer vision, which captures, processes, analyses and interprets images; machine vision, which enables product identification, product quality control; video analytics.
- **Technologies performing analysis of written language** (text mining). Text mining is a process in which large amounts of text are converted into useful information for various purposes. An example of such technology is Natural Language Processing (NLP).
- **Technologies converting spoken language into machine-readable format** (speech recognition). This includes, but is not limited to, the use of digital assistants such as Google Voice, Amazon Alexa, Microsoft Cortana, Apple Siri.
- **Technologies generating written or spoken language** (natural language generation). These technologies allow speech recognition, translation from one language to another (e.g. Google Translate). It can be used for automated document writing, e.g. for product descriptions, preparing meeting notes and other (current transcript). An example of use is also a chatbot, which works on the basis of artificial intelligence and allows communication with customers in the form of text messages based on methods such as natural language generation and machine learning.
- **Machine learning** (e.g. deep learning) for data analysis. Machine learning is a method by which algorithms create a model (e.g. decision trees, regression model) used for data analysis or prediction. It is used e.g. in recommendation systems in online sales, in dynamic price adjustment, in predictive maintenance, advanced sales forecast analysts, distribution optimization, inventory, for detection and prevention of cyber-attacks.
- **Technologies automating different workflows or assisting in decision-making** (artificial intelligence based software robotic process automation). Intelligent automation (robotic process automation – RPA, which uses artificial intelligence) is a solution that automates business

processes with the help of software robots, e.g. opening an electronic attachment, scanning prices from websites.

- **Technologies enabling physical movement of machines via autonomous decisions based on observation of surroundings**, e.g. autonomous robots, self-driving vehicles, autonomous drones. These include, for example, robots that use machine learning, or self-driving vehicles that use for safe driving a combination of machine learning and computer vision. Autonomous robots are intelligent machines that can perform tasks on their own, e.g. in warehouses.

## 7 EXPLANATIONS

### 7.1 CLASSIFICATIONS

Data are published:

- by the size of the enterprise, regarding the number of employees and self-employed,
- by activities, according to the European statistical classification of economic activities NACE Rev. 2,
- by ICT sector.

According to the OECD definition, the ICT sector comprises enterprises that are engaged in the production or provision of services of information-communication technologies and are registered in the following NACE Rev. 2 activities: ICT manufacturing sector (C26.1 – Manufacture of electronic components and boards, C26.2 – Manufacture of computers and peripheral equipment, C26.3 – Manufacture of communication equipment, C26.4 – Manufacture of consumer electronics, C26.8 – Manufacture of magnetic and optical media); service ICT sector (G46.5 – Wholesale of information and communication equipment, J58.2 – Software publishing, J61 – Telecommunications, J62 – Computer programming, consultancy and related activities, J63.1 – Data processing, hosting and related activities; web portals, S95.1 – Repair of computers and communication equipment).

The Standard Classification of Activities SKD 2008 <http://www.stat.si/doc/pub/skd.pdf> is the national version of the European statistical classification of economic activities NACE. Rev. 2,

<https://ec.europa.eu/eurostat/documents/3859598/5902521/KS-RA-07-015-EN.PDF/dd5443f5-b886-40e4-920d-9df03590ff91?version=1.0>

SKD 2008 includes all activities of the European classification and adds some national subclasses

### 7.2 DATA PROCESSING

#### DATA EDITING

Data were edited by using appropriate individual corrections.

For more, see the general methodological explanations [Statistical data editing](#).

## **WEIGHTING**

With weighting adjustment we want to achieve representativeness of the sample, so that the weighted data give us as good population estimates as possible. The process of weighting depends on the sampling design, the unit non-response rate and available auxiliary variables used for calibration. The final weight is the product of the sampling weight, the non-response weight and the calibration factor.

## **SEASONAL ADJUSTMENT**

Seasonal adjustment is not applicable.

## **7.3 INDICES**

Indices are not published.

## **7.4 PRECISION**

In statistical surveys different kinds of errors can occur (e.g. sampling error, nonresponse error, measurement error) influencing the accuracy of the statistical results. Errors deriving from the random mechanisms determine the precision of the statistical estimates. The Statistical Office of the Republic of Slovenia draws attention to less precise estimates by flagging them with a special sign or by not publishing them at all.

1. If the table contains estimated population totals of (continuous) variables (e.g. the value of web sales), publishing limitations are determined by the relative standard errors or the coefficients of variation (CV). In such cases it holds:

If the coefficient of variation (CV) of the estimate is:

- 10% or below ( $CV \leq 10\%$ ), the estimate is of acceptable precision and is published without limitations;
- in the interval from 10% and up to 30% ( $10\% < CV \leq 30\%$ ), the estimate is less precise and is flagged for caution with letter M;
- over 30% ( $CV > 30\%$ ), the estimate is too imprecise to be published and therefore suppressed for use by letter N.

2. If the table contains estimated number of units with certain characteristics (e.g. the extent of ICT usage), publishing limitations are determined by the standard errors of the estimates (SE) of the proportions. In such cases it holds:

If the standard error (SE) of the estimate of a proportion is:

- 0.05 or below ( $SE \leq 0.05$ ), the estimate is of acceptable precision and is published without limitations;
- in the interval from 0.05 and up to 0.15 ( $0.05 < SE \leq 0.15$ ), the estimate is less precise and is flagged for caution with letter M;
- over 0.15 ( $SE > 0.15$ ), the estimate is too imprecise to be published and therefore suppressed for use by letter N.

For more, see the general methodological explanations [Precision of statistical estimates](#)

## 7.5 OTHER EXPLANATIONS

Data that are statistically protected to respect the confidentiality of reporting units are replaced with the letter »z«.

Totals are not always accurate due to rounding.

## 8 PUBLISHING

- SiStat Database: [Development and Technology](#) – Digital society –

[Usage of information-communication technologies \(ICT\) in enterprises.](#)

Data are published in the form of absolute values by the size of the enterprise, number of persons employed and 2-level the Standard Classification of Activities SKD 2008.

- First Release (Development and Technology, Digital Society): »Digital Entrepreneurship, Slovenia, annually«.
- First Release (Development and Technology, Digital Society): »Web sales, Slovenia, annually«.
- Electronic Release (Development and Technology, Digital Society): »Digital Entrepreneurship, detailed data, Slovenia, annually«.
- [Statobook](#)
- [E-skills and Digital Economy](#)
- EUROSTAT (Statistical Office of the European Union)
- United Nations (UN)
- Organisation for Economic Co-operation and Development (OECD)
- International Telecommunication Union (ITU)

## 9 REVISION OF THE DATA

### 9.1 PUBLISHING OF PRELIMINARY AND FINAL DATA

Provisional data are not disseminated. Only final data are published.

### 9.2 FACTORS INFLUENCING COMPARABILITY OVER TIME

There is a break in the time series in 2021, so the data from 2021 on are no longer fully comparable with the data from previous years. The reason for a break in the series is the inclusion of enterprises registered in activity 75 – Veterinary activities in the survey.

Until 2017 data was published under the following titles:

- First Release (Development and Technology, Digital Society): »Usage of information-communication technologies in enterprises, Slovenia, annually«.
- Electronic Release (Development and Technology, Digital Society): »Usage of information-communication technologies in enterprises, detailed data, Slovenia, annually«.

## 10 OTHER METHODOLOGICAL MATERIALS

Methodological materials on SURSs website are available at <https://www.stat.si/statweb/en/Methods/QuestionnairesMethodologicalExplanationsQualityReports>.

- Questionnaire:
  - Uporaba informacijsko-komunikacijske tehnologije in e-trgovanje v podjetjih (IKT-PODJ)

Theme: Development and Technology, Subtheme: Digital Society

- Quality report for the survey:
  - Usage of the information-communication technologies (ICT) in enterprises (IKT-PODJ)

Theme: Development and Technology, SubTheme: Digital Society

- Methodological explanations:
  - Usage of information-communication technologies in enterprises

Theme: Development and Technology, Subtheme: Digital Society

- Methodology Eurostat:

<https://circabc.europa.eu/faces/jsp/extension/wai/navigation/container.jsp>