

21. INFORMATION AND COMMUNICATION TECHNOLOGIES

The term of **information and communication technologies** (hereinafter as the ICT) shall generally mean technologies as mobile phones, computers, and the Internet and systems, activities and processes connected to them, which contribute to the imaging, processing, storage and transmission of information and data in an electronic form.

The information and communication technology statistics aim is, on one hand, to provide data on the production and supply of advanced ICT, including data on investments, external trade, qualified human resources in this field (**information economy statistics**) and, on the other hand, on the penetration, rate, and forms of these technologies and systems utilisation in enterprises, households, public administration, education, and health (**information society statistics**).

Data given in this Chapter were acquired, in most cases, from regular statistical surveys of the CZSO, that is, first of all, from annual surveys on the ICT use in respective sectors of the society and, furthermore, from statistics of the Czech Telecommunication Office, Institute of Health Information and Statistics of the Czech Republic, and on the Ministry of Education, Youth and Sports of the CR.

Notes on Tables

Table 21-1. **Basic indicators of the telecommunication and Internet infrastructure**

Data are based on the number of registered domains and also taken from data sources of the Czech Telecommunication Office.

A **subscriber to publicly accessible services of electronic communications** shall mean a natural or legal person, which has concluded a contract on providing of such services with an entrepreneur providing the services.

A **subscriber's telephone station of a public fixed telephone network** is a set of technical means defined by the end point (of the operation) of the public switched telephone network (PSTN) and unambiguously determined by the telephone exchange ending. The subscribers' stations are further classified as **residential telephone lines** and **business telephone lines**. **Public telephone boxes or slot machines** are also counted as subscribers' stations.

A **subscriber's VoIP telephone station** shall mean voice service provided by means of the VoIP technology (Voice over Internet Protocol) also called IP telephony, which enables voice transmission over packet-switched data networks and signal transmission by means of Internet Protocol (IP) packets. Voice services by means of the VoIP technology are an alternative to voice services provided by means of the traditional public switched telephone network (PSTN).

The **SIM card** is a subscriber's identification card serving for the identification of the subscriber in the public mobile telephone network. They involve both **prepaid SIM cards**, when the customer does not conclude any contract with the provider and only prepays a certain amount, which the provider deduces payments for services provided from, and **tariff SIM cards** also called **post-paid SIM cards**, when customers have concluded an agreement with the operator, on the basis of which they pay for services according to monthly invoices.

Only SIM cards, which were used at least once in the last three month for originating and terminating of calls, sending of SMS, MMS, or for data services, are considered to be the **active prepaid SIM cards**.

The total **telephone traffic** originated in public fixed or mobile telephone networks, respectively, is measured by means of the number of actually called minutes (real minutes of calling, not the invoiced ones).

The **broadband Internet access** is a **permanently** available access to the Internet with nominal speed ≥ 256 kb/s towards the subscriber (download). The service subscriber can be both natural and legal person, which has a contract concluded with a service provider. The number of subscribers to this service is measured on the basis of the number of access points where subscribers are provided with the service for one of below mentioned technologies employed for the Internet access.

The broadband Internet access by means of **DSL** (Digital Subscriber Line) technology enables broadband connectivity by means of the metallic subscriber's line (telephone line). At present, the most frequently used type of this connection is ADSL, which features asymmetric connection when the speed of data transmission to the user (downloaded) is higher than that of data sent from the user towards the Internet (uploaded).

The broadband **wireless** Internet access includes the connection by means of a radio line both in licensed frequency bands (FWA) and in frequency bands with no licence required (based on Wi-Fi technology).

FWA (Fixed Wireless Access) is the description of "fixed" wireless access by means of a radio connection. It is characteristic by the placing of the end point device on a fixed location. Sometimes this alternative is also called WLL (Wireless Local Loop).

WiFi (Wireless Fidelity) is the broadband connection by means of a radio network using technologies compliant with the standard IEEE 802.11. This type of connection is sometimes called WLAN (Wireless Local Access Network) as well.

The broadband **mobile Internet access** includes the connection by means of mobile telephone networks within standard voice and data services (temporary / ad hoc access) or offered as separated from voice services with potential of permanent accessibility (dedicated access). This access is implemented by means of SIM cards or data cards/modems compliant with the standards of CDMA (Code Division Multiple Access) or UMTS (Universal Mobile Telecommunication System) offered separately from voice services.

CDMA 2000 and **UMTS** are standards of the ITU-2000 for 3rd generation (3G) of mobile networks enabling high-speed data transmission, including the Internet access.

The broadband Internet access by means of **optical fibre** (FTTx) includes optical connections of the type of FTTH (Fibre to the Home), when the optical fibre takes the optical connectivity to the dwelling, and FTTB (Fibre to the Building), when the optical fibre takes the optical connectivity to the building only and indoor the connection is distributed by other means (by a radio network or over a fixed local network, for instance).

FTTx (Fibre to the x) is a general name of all types of the broadband network architecture that applies optical fibre.

CATV (Cable TV) shall mean a cable television, which in this case provides the Internet access by means of a cable modem.

A **domain** (an Internet domain or also a domain name) is a unique name (identifier) of a computer or a computer network connected to the Internet. The domain is registered at a registration authority authorized to administer respective top level domains.

Table 21-2. ICT professionals and technicians

Professionals on information technology (ICT professionals) are subdivided into two major groups while their classification is based on the classification ISCO 08 (the corresponding classification in the Czech Republic is the Classification of Occupations (CZ-ISCO)) as follows:

- Information and communications technology professionals (CZ-ISCO code 25, 133, 2434); and
- Information and communications technicians (CZ-ISCO code 35, 7422).

The data on the **numbers of ICT professionals** come from the Labour Force Sample Survey of the CZSO (table presents average annual data for given years). Detailed data on the LFSS are available in Chapter 10. Labour Market, Part B.

Data on **ICT professionals' wages** come from the structural wage statistics. Detailed data on the structural wage statistics broken down according to the Classification of Occupations can be found in Chapter 10. Labour Market, Part A, exactly in notes on Tables 10-4 and 10-5.

Tables 21-3 and 21-4. Investments into ICT equipment and software

Investments into ICT equipment and software in the tables shall mean the gross fixed capital formation (P.51), which includes acquisitions fixed assets (P.511) and expenses for transition of non-produced assets into ownership (P.512) classified to the following CZ-CPA groups:

ICT equipment

26.2 Computers and peripheral equipment;

26.3 Communication equipment;

Software

58.2 Software publishing services; and

62.0 Computer programming, consultancy and related services.

In 2014 the calculation of ICT investments was changed within the revision of national accounts according to a new international standard of ESA 2010. This change, which brought an important increase in investments in this field, was implemented back in the whole time series observed.

This means mainly that expenditure on small property as smart phones, notebooks, or tablets, which are used in the production process and their lifetime is longer than one year, is included into investments (small property capitalisation). According to the previous standard for national accounts of the ESA 1995 this expenditure was taken as production consumption. The calculation of the own production software capitalisation was also made more precise within the national accounts revision.

Investments into computer and telecommunication equipment became a part of a newly created item of non-financial assets as ICT equipment (AN.1132). Computer software and databases (AN.1173) newly involve two sub-items as follows: Computer software (AN.11731) and Databases (AN.11732).

The data come from the annual national accounts statistics. Detailed information is available in Chapter 5. National Accounts.

Tables 21-5 to 21-7. External trade in ICT goods and services

Goods and services in the field of information and communication technology (hereinafter as the **ICT goods and services**) are defined as goods or services, which core function is to implement or enable communications or information processing, including their electronic transmission and imaging (OECD 2009).

The **list of ICT goods**, that is used for the external trade statistics, is based on the Harmonised System (HS2007), an international classification of goods used for the international trade. ICT goods, for purposes of the external trade statistics, is divided into the five main categories as follows:

- computers and peripheral equipment;
- communication equipment;
- consumer electronics;
- electronic components; and
- miscellaneous ICT components and goods.

Detailed definitions of main groups of the ICT goods are available found on the CZSO web pages in the section Statistics – Information Technology – Information Economy under the link External Trade in the ICT Goods.

Data on exports and imports of the ICT goods come from data outputs of the external trade statistics (External Trade Statistics Database of the CZSO). Detailed information is available in Chapter 11. External Trade.

Due to substantial changes to definitions and content of respective items of the ICT goods in the classification of the Harmonised System 2007 compared to its previous version of 2002 the data on external trade in ICT goods before 2007 are not published in the Statistical Yearbook.

Data on exports and imports of the ICT services come from the CZSO direct survey at respondents on exports and imports of services. Respective items of the ICT services are then defined according to the Classification of Services of 2009, which contains three-digit numerical codes of services based on the international classification of Extended Balance of Payment Services (EBOPS). The ICT services are subdivided into two fundamental categories as follows:

- telecommunication services (code 247); and
- IT services – services in the field of computer technology (code 263).

Table 21-8. Basic indicators of enterprises of the information economy industries

The **information economy sector** is a new alternative grouping of economic activities defined within the International Standard Industrial Classification of All Economic Activities (ISIC), Revision 4 and according to the OECD international standards for economic activities included both in the ICT sector and into the information and media ones.

The **ICT sector** is defined as a combination of economic activities of manufacturing products (technology) or providing services primarily dedicated to processing, communication, and distribution of information electronically, including information capture, storage, transmission, and imaging.

The **information and media sector** is defined as a combination of economic activities producing, issuing, and/or distributing content primarily dedicated to inform, educate, and/or entertain people by means of mass media (communication means).

The **information economy sector** involves businesses, which dominating activities belong to the CZ-NACE groups and classes as follows:

ICT manufacturing:

- Group 26.1 – Manufacture of electronic components and boards;
- Group 26.2 – Manufacture of computers and peripheral equipment;
- Group 26.3 – Manufacture of communication equipment;
- Group 26.4 – Manufacture of consumer electronics; and
- Group 26.8 – Manufacture of magnetic and optical media.

Trade in ICT:

- Group 46.5 – Wholesale of information and communication equipment.

Telecommunication activities:

- Group 61.1 – Wired telecommunications activities;
- Group 61.2 – Wireless telecommunications activities;
- Group 61.3 – Satellite telecommunications activities; and
- Group 61.9 – Other telecommunications activities.

IT services:

- Group 58.2 – Software publishing;
- Class 62.01 – Computer programming activities;
- Class 62.02 – Computer consultancy activities;

Class 62.03 – Computer facilities management activities;

Class 62.09 – Other information technology and computer service activities;

Group 63.1 – Data processing, hosting and related activities; web portals; and

Group 95.1 – Repair of computers and communication equipment.

Information and media activities:

Group 58.1 – Publishing of books, periodicals and other publishing activities;

Group 59.1 – Motion picture, video and television programme activities;

Group 59.2 – Sound recording and music publishing activities;

Group 60.1 – Radio broadcasting;

Group 60.2 – Television programming and broadcasting activities; and

Group 63.9 – Other information service activities.

Indicators in these tables were obtained from the annual structural survey of business entities from selected production industries providing a detailed range of final data, which are available at a longer time delay. In the case of structural (annual) statistics the first reference period for the data processing according to the new Classification of Economic Activities was the year 2008. Data for 2005–2007 are based on the recalculation of structural data. Detailed information on the publishing of the data from the annual structural survey of business entities from selected production industries is available in Chapter 15. Industry.

Definitions of employment indicators are given in Chapter 10. Labour Market. The methodological content of financial indicators is defined in Chapter 15. Industry, and definitions of sales indicators are in Chapter 18. Trade, Hotels, Restaurants, and Tourism.

Tables 21-9 to 21-13. ICT and their utilisation in enterprises

The data are based on the **annual survey on the ICT utilisation in the business sector**. This survey is carried out on a selected sample of approx. nine thousand enterprises **with 10+ employees** in selected industries. Results are then grossed up to the whole population of the enterprises monitored.

The data monitored are obtained for January of a given year (**reference period**). In the case of e-commerce and the Internet usage in relation to public administration (Table 21-26) the data relate to the whole given year.

Electronic commerce (e-commerce) shall mean purchases or sales (placing or accepting orders) via the Internet or other computer networks through websites or the electronic data interchange (EDI), regardless the method of payment or delivery. Purchases (sales) implemented on the basis of orders prepared from information obtained on the Internet but placed in a traditional way (by phone, fax, or written order) or by electronic mail are not included.

The **fixed high-speed access** shall mean a connection to the Internet by means of the technologies (services) as follows: ADSL or other DSL technology; fixed wireless access (FWA); connection through cable television networks (CATV); rented data network of telecommunication operators, and other connection enabling transmission speed 256 kb/s and higher.

Tables 21-14 and 21-15. Household consumption expenditure on ICT equipment and services and households with a fixed line and a mobile phone

Tables give data from the sample survey of the **Household Budget Survey (HBS)**, which monitors private household economy and provides information on household expenditure and the structure of household consumption. Detailed information on the HBS and interpreting of its outcomes can be found in Chapter 9. Household Income and Expenditure.

Tables 21-16 to 21-22. ICT in households and its utilisation by individuals

The data are based on the **Sample Survey on the ICT Utilisation in Households and by Individuals**, which had been carried out within the Labour Force Sample Survey since 2005 and since 2012 it has been performed within the Integrated Surveys in Households (ISH). The survey is carried out using the CAPI (Computer Assisted Personal Interviewing) method on the sample of about 10 000 individuals aged 16+ years. In line with the LFSS and ISH methodologies, the results were imputed to the whole population of the Czech Republic.

Concerning data on **households** the existing status in the reference period (2nd quarter of a year monitored) is obtained; data for **individuals** are for the last three months before the survey implementation, except for data on the Internet use in relation to public administration (Table 21-27) where data are related to 12 months before the survey implementation.

Households with computer involve all households, which at the time of the survey stated, that at least one of the household members had an access to a personal computer at home. The household does not need to be in possession of the computer (employer's computer, borrowed from friends, etc.) yet this computer should be functional and physically located at home. In the case of a portable computer this may not be

permanently located at home – over a day or week it may be in use at work, at school, but in the evenings and weekends the household may use it at home.

Households with the Internet include all households, which at the time of survey stated, that at least one of the household members had an access to the Internet at home. It does not matter what type is the device used (desktop computer, portable computer, mobile phone, digital TV, game deck, or other device), or the way of connection (ADSL, wireless, through a digital TV, dial-up, mobile connection, etc.).

A method the household is connected to the Internet includes merely the type of household connectivity delivered by the provider and not a method of potential sharing of this connectivity by multiple computers within one household.

Respective types of high-speed (broadband) connection to the Internet are given in explanatory notes to Table 21-1.

Individuals using the PC/Internet (users of the PC/Internet). The individual who used a personal computer/Internet at least once in the last three months is considered to be a personal computer/Internet user.

The **computer use** includes any use of any private, work, or borrowed personal computer (desktop, portable, palmtop) anywhere (at home, work, school, and library) and for whatever reason (private or work).

The **Internet use** shall mean any activity on the Internet carried out in an active manner, for instance, browsing of websites, downloading of files, using emails, from any location (household, school, work, etc.) for any purpose (private, work, etc.) both on computers (including portable ones) and mobile phones, smart phones, game decks, etc.

Internet activities monitored are activities on the Internet, which respondents carried out for **private purposes** in the last three months before the survey implementation date. Only the cases of an on-line purchase and the Internet use in the interaction with public administration have the reference period of twelve months before the survey implementation date.

Educational attainment in the case of the ICT utilisation by individuals is published for the age group 25+ years. There is a lot of student in the age 16–24 years, who have low educational attainment, yet they use ICT in a very intensive way. Thus if the age group 16–24 years is not included it enables to make a more accurate assessment of the educational attainment effect on the ICT use.

Households with children shall mean households with unprovided children that are defined as children/ persons till the terminated school attendance and then as persons studying further, yet to the age of 26 years, at the oldest. More can be found in Section 11 of the Act No. 117/1995 Sb. on state social support as amended.

A student shall mean an individual who studies and simultaneously is economically inactive i.e. may be classified neither as the employed nor the unemployed person.

A purchase over the Internet shall mean the on-line ordering of goods or services through an electronic way over the Internet. The act of purchase over the Internet comprises, concerning the position of the purchaser, of a series of websites, which the purchaser browse through and which enable placing orders. Goods ordered through these networks may not be paid over the Internet, goods or services may be delivered on-line (over the Internet) or off-line (mail, or in person). Mere decision on the purchase on the basis of information acquired through the Internet is not considered to be an Internet purchase. The same holds for purchases implemented on the basis of orders, which were placed by a classic, written, and sent e-mail.

Table 21-23. Personal computers in schools

Data on ICT hardware and software in schools in the Czech Republic come from data sources of the Ministry of Education, Youth and Sports of the CR, which collects data on available IT infrastructure in basic, secondary, and higher professional schools.

Due to the methodology the total average numbers for the Czech Republic are lower than appropriate numbers of respective stages of schools. The reason is that in many school buildings classes are taught to multiple stages and/or types of schools and therefore the same computer is often available to and thus counted for pupils of several stages and/or types. Yet the computer is counted into the average of all school stages and/or types only once.

Table 21-24. Independent surgeries of physicians having selected information technologies

The data come from the annual questionnaire on employers, registered number of employees, and contracted staff, which is prepared by the Institute of Health Information and Statistics of the CR in cooperation with the Ministry of Health of the CR and the CZSO.

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Further data can be found on the web pages of the Czech Statistical Office at:

– www.czso.cz/eng/redakce.nsf/i/information_technologies