

Science and technology

Research and development (R & D) is often considered as a driving force behind economic growth, job creation, innovation, and the subsequent increasing quality of products. The seventh framework programme for research and technological development (FP7) is the EU's main instrument for funding research in Europe⁽¹⁾; it runs from 2007-2013 and has a total budget of EUR 53 200 million. This money is generally intended to finance grants to research actors all over Europe, usually through co-financing research, technological development and demonstration projects. Grants are determined on the basis of calls for proposals and a peer review process. The main aims of FP7 are to increase Europe's growth, competitiveness and employment. This is done through a number of initiatives and existing programmes including, the competitiveness and innovation framework programme⁽²⁾, educational and training programmes, as well as regional development through structural and cohesion funds. FP7 is made up of four broad programmes (cooperation, ideas, people and capacities) and a fifth specific programme on nuclear research. The ten thematic areas that are covered by FP7 cooperation include: health, food, agriculture and biotechnology, information and communication technologies, nanosciences, nanotechnologies, materials and new production technologies, energy, environment, transport, socio-economic sciences and humanities, space and security.

In 2000, the EU decided to create the European Research Area (ERA): a unified area all across Europe, which should:

- enable researchers to move and interact seamlessly, benefit from world-class infrastructures and work with excellent networks of research institutions;
- share, teach, value and use knowledge effectively for social, business and policy purposes;
- optimise and open European, national and regional research programmes in order to support the best research throughout Europe and coordinate these programmes to address major challenges together;
- develop strong links with partners around the world so that Europe benefits from the worldwide progress of knowledge, contributes to global development and takes a leading role in international initiatives to solve global issues.

(1) http://cordis.europa.eu/fp7/home_en.html.

(2) <http://cordis.europa.eu/innovation/en/policy/cip.htm>.



A debate was conducted during 2007 on what should be done to create a more unified and attractive research area to meet the needs of business, the scientific community and citizens. The European Commission published a Green paper on the ERA reviewing progress made. In 2008 a new set of initiatives to develop the ERA were launched, including enhanced political governance of ERA, called the 'Ljubljana Process', as well as specific initiatives for five different areas (researchers' careers and mobility, research infrastructures, knowledge sharing, research programmes and international science and technology cooperation).

Information technology develops on a daily basis, and it may be argued that a society's wealth and growth are, at least to some degree, based on its ability to handle information efficiently. Information technology is not only a technical phenomenon, it is a means of transforming the way in which people communicate, do business, and live their everyday lives. It holds enormous potential and opportunities for Europe's economy and societies. The i2010 initiative⁽³⁾ is the European Commission's strategic policy framework in this area, laying out broad policy guidelines for the information society and media in the years up to 2010. It is designed to promote an open and competitive digital economy, research into information and communication technologies, as well as their application to improve social inclusion, public services and the quality of life.

14.1 Personnel

Introduction

The European Commission has placed renewed emphasis on the conversion of Europe's scientific expertise into marketable products and services, while also focusing on improving the mobility of European researchers, encouraging networks between researchers from different Member States, and promoting R & D as an occupation for women.

This latter point has been one particular area of concern for policy-makers who consider that women's intellectual potential, and their contribution to society are not being fully capitalised upon. In particular, their participation is low in certain branches of the natural sciences, engineering and technology, which are considered key R & D areas. Furthermore, women are also under-represented in the business enterprise sector where the EU's R & D is most highly concentrated, as well as in senior academic grades and influential positions⁽⁴⁾.

In May 2008, the European Commission adopted a communication to launch an initiative for creating a 'European partnership for researchers for mobility and career development'⁽⁵⁾. The goal of this initiative was to improve the mobility of researchers and to enhance the diffusion of knowledge throughout Europe, by: balancing demand and supply for researchers at a European level; helping create centres of excellence, and; improving the skills of researchers in Europe.

(3) http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm.

(4) <http://ec.europa.eu/research/science-society/index.cfm?fuseaction=public.topic&id=27>.

(5) <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2008:0317:FIN:EN:HTML>.

Definition and data availability

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems, and in the management of the projects concerned.

Data on **R & D personnel** provide indicators for useful international comparisons of human resources devoted to R & D activity. R & D personnel include all persons employed directly on R & D, plus persons supplying direct services to R&D, such as managers, administrative staff and office staff. For statistical purposes, indicators on R & D personnel who are mainly or partly employed on R & D are compiled as head counts (HC) and as full-time equivalents (FTEs), or person-years.

Eurostat also compiles a number of series in relation to stocks of **human resources in science and technology (HRST)** with breakdowns available according to gender, age, region, sector of activity, occupation, educational attainment and fields of education (although it should be noted that not all combinations are possible). This information is derived from the Labour Force Survey (LFS). HRST indicators are presented as absolute figures and as shares of the economically active population in the age group 25 to 64 years old. HRST are defined as persons having either successfully completed tertiary education, or persons who are employed in an occupation where such an education is normally required.

Data on **employment in high-and medium-high technology manufacturing and in high-technology knowledge-intensive service sectors** and related derived indicators are also built-up using data from the LFS; these data are available both at the national and regional level. The definition of high- and medium-high technology manufacturing sectors is based on the OECD definition. **High-technology manufacturing** comprises manufacturing of office machinery and computers, manufacturing of radio, television and communication equipment and apparatus, and manufacturing of medical precision and optical instruments, watches and clocks. **Medium-high-technology manufacturing** includes the manufacture of chemicals and chemical products, manufacture of machinery and equipment n.e.c., manufacture of electrical machinery and apparatus n.e.c., manufacture of motor vehicles, trailers and semi-trailers, and manufacturing of transport equipment. The definition of **high-technology knowledge-intensive services (KIS)** is based on a selection of relevant items of NACE Rev. 1; it comprises water transport, air transport, post and telecommunications, financial intermediation, insurance and pension funding (except compulsory social security), activities auxiliary to financial intermediation, real estate activities, renting of machinery and equipment without operator and of personal and household goods, computer and related activities, research and development, other business activities, education, health and social work, and recreational, cultural and sporting activities.



Education statistics are based on the International Standard Classification of Education (ISCED). The basic unit of classification in ISCED-97 is the educational programme. The number of PhD graduates is measured by graduates from ISCED level 6. Indicators on the number of PhD students provide an idea of the extent to which countries will have researchers at the highest level of education in the future. The data on science and technology graduates relate to the number of new graduates in the reference year, not the total number (stock) available in the labour market that year. The term PhD is defined in terms of general tertiary programmes which lead to the award of an advanced research degree, e.g. a doctorate in economics. The programmes are therefore devoted to advanced study and original research and are not based on course-work alone. They usually require 3-5 years of research and course work, generally after a master's degree.

The indicator of **tertiary graduates in science and technology** includes new graduates from all public and private institutions completing graduate and post graduate studies in science and technology fields, and is calculated as a percentage of all graduates.

Main findings

The number of researchers in the EU-27 regularly increased in recent years. There were approximately 1.3 million researchers in full-time equivalents in the EU-27 in 2006, which marked an 18 % increase on the level from 2000. According to a gender breakdown, men accounted for the majority of researchers in all sectors, and represented slightly less than three quarters (72 %) of the total R & D workforce; there was almost no change in the proportion of male and female researchers during the period 2000-2006.

Turning to a breakdown of the number of researchers by institutional sector, there were different patterns among the Member States. The business sector concentrated more than 60 % of all researchers in Luxembourg, Sweden, Austria, Denmark, Germany and the Netherlands in 2006. Bulgaria was the only country to report a majority of its researchers in the government sector (almost 60 %), while the Baltic Member States, Poland, Slovakia, Greece, Cyprus, Portugal (2005) and Malta, all reported that more than half of all researchers were working in the higher education sector.

The gender split among PhD students in 2006 was generally much more balanced: as a majority of PhD students were female in the Baltic Member States, Portugal, Italy, Finland, Spain and Bulgaria, and women accounted for at least 40 % of PhD students in all of the other Member States for which data are available, with the exception of the Czech Republic and Malta.

Finland reported the highest proportion of R & D personnel (3.0 %) as a share of the total labour force, with more than twice the EU-27 average, which stood at 1.3 % in 2006; the remaining Nordic countries and Luxembourg (all 2005) also reported a relatively high propensity to employ R & D personnel.

An average of 6.6 % of those in employment in the EU-27 worked in high- and medium-high-technology manufacturing sectors in 2006 (a reduction of 0.8 percentage points in relation to the share some five years before). Germany and the Czech Republic had the highest shares of

their national workforces employed within high- and medium-high-technology manufacturing sectors, both into double-digits, and in Slovakia this share grew at a rapid pace to reach 9.6 %. Sweden, Denmark, Luxembourg, the United Kingdom, the Netherlands and Finland had the highest shares of total employment in knowledge-intensive services (KIS) in 2006, with upwards of 40 % of their respective workforces employed in this area. Furthermore, the share of the total workforce employed in these activities rose in each of the countries, often quite considerably, between 1996 and 2006.

**Table 14.1:** Researchers, by institutional sector, 2006 (1)

	Total - all sectors	Business enterprise sector		Government sector		Higher education sector	
	(1 000 FTE)	(1 000 FTE)	(% of total)	(1 000 FTE)	(% of total)	(1 000 FTE)	(% of total)
EU-27	1 301.0	641.3	49.3	180.4	13.9	462.9	35.6
Euro area	895.3	450.3	50.3	124.5	13.9	308.7	34.5
Belgium	33.9	17.1	50.5	2.5	7.4	14.0	41.4
Bulgaria	10.3	1.3	12.6	6.1	59.5	2.8	26.7
Czech Republic	26.3	11.3	43.0	6.6	25.0	8.4	31.8
Denmark	28.7	17.4	60.6	2.2	7.6	8.9	31.0
Germany	282.1	171.1	60.6	40.0	14.2	71.0	25.2
Estonia	3.5	0.9	24.9	0.5	14.6	2.0	58.1
Ireland	12.2	7.0	57.5	0.5	4.1	4.7	38.4
Greece	19.9	5.4	27.1	2.3	11.3	12.1	60.8
Spain	115.8	39.9	34.5	20.1	17.3	55.4	47.9
France (2)	204.5	108.8	53.2	25.9	12.7	66.3	32.4
Italy (3)	82.5	28.8	34.9	14.9	18.0	37.1	44.9
Cyprus	0.8	0.2	23.2	0.1	15.2	0.4	57.0
Latvia	4.0	0.8	19.3	0.6	14.9	2.6	65.8
Lithuania	8.0	0.9	10.9	1.7	21.2	5.5	67.8
Luxembourg	2.3	1.7	73.9	0.4	16.5	0.2	9.6
Hungary	17.5	6.2	35.6	5.2	29.8	6.1	34.6
Malta	0.5	0.2	46.3	0.0	3.6	0.2	50.1
Netherlands	45.9	27.8	60.6	7.1	15.6	:	:
Austria	30.5	19.4	63.6	1.2	4.0	9.7	31.9
Poland	59.6	9.3	15.7	12.4	20.9	37.7	63.2
Portugal (2)	21.1	4.0	19.0	3.3	15.8	11.0	51.9
Romania	20.5	7.7	37.6	5.6	27.2	7.1	34.8
Slovenia	5.8	2.3	38.8	1.8	30.9	1.7	29.8
Slovakia	11.8	1.9	16.1	2.5	21.2	7.4	62.6
Finland	40.4	22.7	56.2	4.5	11.1	12.8	31.8
Sweden	55.7	37.7	67.6	3.0	5.5	14.7	26.4
United Kingdom (4)	180.5	93.8	52.0	8.9	5.0	:	:
Croatia	5.2	0.7	13.8	1.6	31.2	2.9	54.9
Turkey	42.7	11.2	26.4	4.7	11.0	26.7	62.6
Iceland (2)	2.2	1.0	47.0	0.5	23.2	0.6	27.1
Norway (5)	21.7	11.7	53.8	3.4	15.9	7.5	34.7
Switzerland (6)	25.4	12.6	49.8	0.4	1.7	12.3	48.6
Japan (2)	704.9	481.5	68.3	34.0	4.8	180.5	25.6
United States (7)	1 394.7	1 104.5	79.2	:	:	:	:

(1) Shares do not sum to 100 % due to estimates, differences in reference years, the exclusion of private non-profit sector data from the table and the conversion of data to a count in terms of FTE.

(2) 2005.

(3) Total - all sectors and higher education sector, 2005.

(4) Total - all sectors, 2005.

(5) 2005, except for business enterprise sector, 2006.

(6) Total - all sectors, business enterprise sector and higher education sector, 2004.

(7) Total - all sectors and business enterprise sector, 2005.

Source: Eurostat (tsc00004), OECD

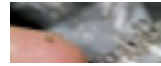
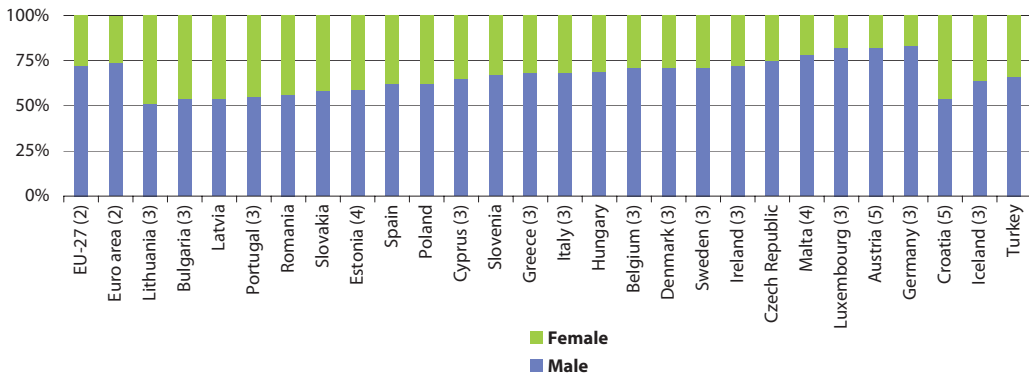


Figure 14.1: Gender breakdown of researchers in all institutional sectors, 2006 (1)

(% of total researchers)

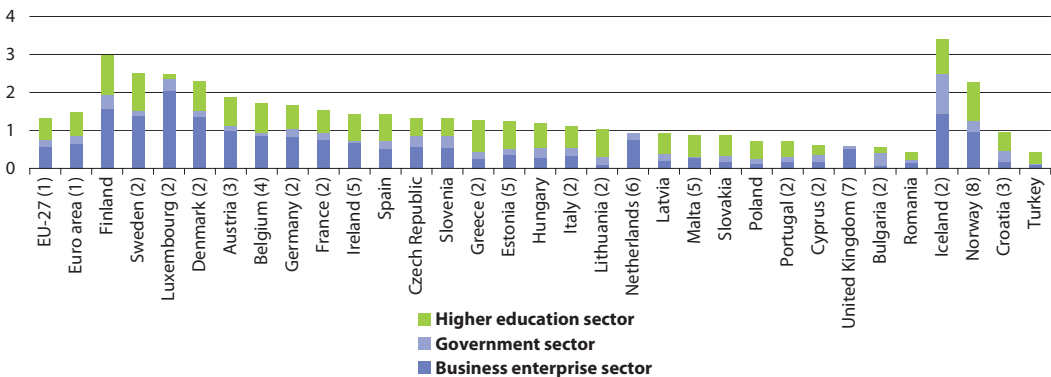


- (1) France, the Netherlands, Finland and the United Kingdom, not available.
- (2) Estimates.
- (3) 2005.
- (4) Provisional.
- (5) 2004.

Source: Eurostat (tsc00006)

Figure 14.2: Proportion of research and development personnel by sector, 2006

(% of the total labour force)



- (1) Estimates.
- (2) 2005.
- (3) 2004.
- (4) Business enterprise sector, estimate; government sector and higher education sector, 2005.
- (5) Business enterprise sector, estimate.
- (6) Business enterprise sector and government sector, 2005; higher education sector, not available.
- (7) Business enterprise sector and government sector, estimate; higher education sector, not available.
- (8) Government sector and high education sector, 2005.

Source: Eurostat (tsc00002)



Table 14.2: PhD students (ISCED level 6), 2006
(% of total PhD students)

	Total number of PhD students (1 000)			Social sciences, business & law	Teacher training & educ.; humanities & arts	Science, maths & computing; engineering, manuf. & construction	Agri-culture & veter-inary	Health & welfare; services	Others (1)
		Male	Female						
EU-27	516.5	52.4	47.6	22.9	21.6	36.9	2.8	13.9	1.9
Belgium	7.5	59.0	41.0	19.6	13.3	46.2	7.1	13.9	0.0
Bulgaria	5.2	49.7	50.3	21.2	22.5	39.7	3.8	12.8	0.0
Czech Republic	22.6	62.1	37.9	16.3	15.3	46.4	4.5	15.8	1.7
Denmark	4.8	54.2	45.8	12.8	14.5	39.3	8.2	25.2	0.0
Germany	:	:	:	:	:	:	:	:	:
Estonia	2.0	46.5	53.5	21.2	21.0	42.3	5.6	9.8	0.0
Ireland	5.1	52.1	47.9	14.7	21.0	49.2	2.0	8.4	4.6
Greece (2)	22.5	55.6	44.4	17.5	22.6	55.9	1.7	2.2	0.0
Spain	77.1	49.0	51.0	23.9	21.8	22.8	2.0	18.5	10.9
France	69.8	53.9	46.1	30.7	27.0	38.9	0.1	3.3	0.0
Italy	38.3	48.3	51.7	19.7	15.0	42.4	6.3	15.6	0.9
Cyprus	0.3	51.0	49.0	21.2	28.8	50.0	0.0	0.0	0.0
Latvia	1.8	39.6	60.4	33.5	24.1	30.1	2.2	10.1	0.0
Lithuania	2.9	43.4	56.6	31.6	13.8	40.8	3.7	10.1	0.0
Luxembourg	:	:	:	:	:	:	:	:	:
Hungary	8.0	53.0	47.0	20.6	24.9	32.2	6.0	16.3	0.0
Malta	0.1	64.1	35.9	20.3	37.5	28.1	0.0	14.1	0.0
Netherlands (3)	7.4	58.6	41.4	:	:	:	:	:	:
Austria	16.8	54.3	45.7	37.9	24.4	29.6	3.3	4.7	0.0
Poland	32.7	50.7	49.3	24.1	30.5	31.2	5.0	9.2	0.0
Portugal	20.5	44.0	56.0	30.2	23.8	29.4	1.8	14.8	0.0
Romania	21.7	51.7	48.3	17.5	15.3	31.6	7.8	27.7	:
Slovenia	1.1	53.5	46.5	15.8	17.2	47.8	3.9	15.3	0.0
Slovakia	10.7	57.1	42.9	19.8	18.4	39.4	3.4	18.9	:
Finland	22.1	48.4	51.6	22.6	24.3	40.2	2.1	10.9	0.0
Sweden	21.4	51.3	48.7	12.4	12.6	41.5	2.0	31.6	0.0
United Kingdom	94.2	55.4	44.6	20.9	21.6	40.5	1.4	15.3	0.3
Croatia	1.3	53.3	46.7	7.2	22.0	46.2	6.5	18.1	0.0
Turkey	32.6	60.6	39.4	24.3	22.5	33.4	8.1	11.7	0.0
Iceland	0.2	41.7	58.3	17.3	28.8	26.9	0.0	26.9	0.0
Norway	5.0	53.6	46.4	17.4	12.7	41.1	4.4	24.4	0.0
Switzerland	17.2	59.7	40.3	26.3	15.6	39.7	2.8	15.3	0.4
Japan	75.0	70.3	29.7	13.2	13.6	33.0	5.8	32.4	2.0
United States	388.7	48.2	51.8	26.9	24.4	30.3	0.8	17.7	0.0

(1) Unknown or not specified.

(2) 2005, except for total number of PhD students, 2006.

(3) Total number of PhD students, 2005.

Source: Eurostat (educ_enr15)

Table 14.3: Human resources in science and technology (1)

	People working in a S&T occupation					People who have a third level education and work in a S&T occupation				
	(1 000)	(% of total employment)				(1 000)	(% of total employment)			
	2006	2003	2004	2005	2006	2006	2003	2004	2005	2006
EU-27	58 856	27.3	28.0	28.4	29.0	34 455	15.4	16.1	16.6	17.0
Belgium	1 303	29.6	29.9	31.1	31.2	919	21.0	21.4	21.6	22.0
Bulgaria	635	22.0	21.2	22.0	20.6	488	15.6	15.4	16.2	15.9
Czech Republic	1 467	29.0	29.3	31.0	31.3	537	10.1	10.4	11.1	11.5
Denmark	983	36.9	37.3	38.9	40.2	676	24.6	25.4	26.5	27.6
Germany	12 474	32.9	33.0	33.5	34.5	6 416	16.9	17.3	17.8	17.7
Estonia	152	23.2	22.8	26.1	26.0	106	15.5	14.9	17.3	18.2
Ireland	419	24.1	24.7	24.2	24.2	324	17.7	18.3	18.1	18.7
Greece (2)	970	19.6	21.0	20.9	22.0	754	15.0	16.5	16.3	17.1
Spain	4 435	21.3	22.4	23.5	23.4	3 519	16.2	17.3	18.1	18.6
France	7 299	29.4	29.3	29.9	29.9	4 567	17.6	17.5	18.3	18.7
Italy (2)	6 785	27.0	29.1	28.6	30.4	2 633	10.2	11.2	11.1	11.8
Cyprus	85	26.8	25.9	25.3	26.0	65	20.1	19.7	18.8	20.0
Latvia (3)	250	21.8	21.4	23.6	25.6	142	10.5	12.2	13.9	14.5
Lithuania	353	21.1	22.5	25.3	24.8	245	13.5	15.0	17.3	17.2
Luxembourg (4)	74	32.8	38.4	38.2	38.7	45	14.1	23.0	25.7	23.9
Hungary	987	24.8	25.5	24.5	25.4	569	13.4	14.4	14.0	14.6
Malta	35	23.8	24.4	26.5	26.6	17	10.1	12.7	13.3	12.8
Netherlands (3)	2 719	39.0	40.0	39.8	38.3	1 640	21.6	23.4	24.0	23.1
Austria (2)	1 075	25.4	32.5	31.0	30.8	443	11.7	13.5	12.9	12.7
Poland	3 577	22.2	22.4	22.9	24.3	2 194	11.7	12.6	13.5	14.9
Portugal (2)	842	14.8	17.5	17.3	17.9	524	8.8	10.9	10.7	11.1
Romania	1 652	17.7	18.0	18.3	19.3	935	8.7	9.6	9.9	10.9
Slovenia (3)	286	29.2	29.7	31.2	32.0	162	15.2	15.7	16.8	18.2
Slovakia	634	25.1	24.4	25.6	27.0	274	9.5	9.7	10.7	11.7
Finland	789	31.9	32.8	33.5	34.4	550	22.7	23.3	23.4	24.0
Sweden	1 641	39.1	39.3	39.6	40.0	1 005	22.5	22.9	23.9	24.5
United Kingdom	6 935	26.2	26.9	27.3	28.0	4 704	17.7	18.4	18.7	19.0
Turkey	2 422	:	:	:	12.5	1 488	:	:	:	7.7
Iceland	50	34.4	34.1	37.7	36.4	22	22.0	21.6	23.9	16.1
Norway	809	36.7	37.9	39.1	39.3	565	24.5	25.3	26.8	27.4
Switzerland	1 396	37.9	38.4	38.7	39.7	763	19.5	20.1	20.9	21.7

(1) Break in series, 2006, with the exception of Belgium and Luxembourg.

(2) Break in series, 2004.

(3) Break in series, 2003.

(4) Break in series, 2003 and 2004.

Source: Eurostat (hrst_st_nsec)

**Table 14.4:** Science and technology graduates

(tertiary graduates in science and technology per 1 000 persons aged 20-29 years)

	Total		Male		Female	
	2000	2005	2000	2005	2000	2005
EU-27	10.0	12.9	13.7	17.6	6.2	8.2
Belgium	9.7	10.9	14.4	15.7	4.9	6.0
Bulgaria	6.6	8.6	7.0	9.9	6.1	7.3
Czech Republic	5.5	8.2	7.8	11.7	3.0	4.6
Denmark	11.7	14.7	16.5	19.3	6.8	10.1
Germany	8.2	9.7	12.6	14.5	3.6	4.8
Estonia	7.8	12.1	10.0	13.5	5.7	10.7
Ireland	24.2	24.5	29.8	33.8	18.5	15.0
Greece	:	10.1	:	11.5	:	8.7
Spain	9.9	11.8	13.3	16.2	6.4	7.2
France	19.6	22.5	27.0	32.0	12.1	12.9
Italy	5.7	9.7	7.2	12.2	4.3	7.2
Cyprus	3.4	3.6	4.9	4.3	2.0	2.7
Latvia	7.4	9.8	10.1	13.0	4.7	6.5
Lithuania	13.5	18.9	17.2	24.2	9.7	13.5
Luxembourg	1.8	:	:	:	:	:
Hungary	4.5	5.1	6.8	7.0	2.1	3.1
Malta	3.4	3.4	4.9	4.6	1.9	2.1
Netherlands	5.8	8.6	9.5	13.6	2.1	3.5
Austria	7.2	9.8	11.6	14.8	2.9	4.6
Poland	6.6	11.1	8.3	13.9	4.8	8.3
Portugal	6.3	12.0	7.3	14.3	5.4	9.7
Romania	4.9	10.3	6.2	12.1	3.5	8.5
Slovenia	8.9	9.8	13.3	14.1	4.2	5.3
Slovakia	5.3	10.2	7.3	12.9	3.2	7.3
Finland	16.0	17.7	22.7	24.3	8.9	10.8
Sweden	11.6	14.4	15.5	18.7	7.6	9.9
United Kingdom	18.5	18.4	25.2	25.3	11.9	11.4
Croatia	:	5.7	:	7.5	:	3.8
FYR of Macedonia	3.7	4.0	4.2	4.1	3.1	3.8
Turkey	4.4	5.7	5.9	8.0	2.8	3.3
Iceland	8.4	10.1	10.3	12.5	6.5	7.6
Liechtenstein	:	12.7	:	18.1	:	7.3
Norway	7.9	9.0	11.4	13.1	4.3	4.7
Switzerland	:	16.1	:	26.8	:	5.4
Japan	12.6	13.7	21.5	23.0	3.3	4.1
United States	9.7	10.6	13.0	14.2	6.2	6.8

Source: Eurostat (tsiir050)

Table 14.5: Proportion of persons working in high- and medium-high-technology manufacturing and knowledge-intensive service sectors (1)

(% of total employment)

	Employment in high- and medium-high-technology manufacturing			Employment in knowledge-intensive services		
	1996	2001	2006	1996	2001	2006
EU-27	:	7.4	6.6	:	30.9	32.8
Belgium	7.7	6.9	6.3	34.6	37.8	38.8
Bulgaria	:	5.5	4.9	:	23.1	22.0
Czech Republic	:	9.2	10.4	:	24.1	25.1
Denmark	7.1	7.0	6.0	40.1	42.7	43.5
Germany	11.1	11.2	10.7	27.9	31.0	34.1
Estonia	:	4.9	3.8	:	28.0	28.6
Ireland	7.1	7.3	5.7	30.2	32.0	34.9
Greece	2.3	2.2	2.3	20.5	22.5	25.0
Spain	5.1	5.5	4.5	23.6	24.8	27.9
France	7.0	7.2	5.9	33.6	35.0	36.9
Italy	7.4	7.4	7.6	24.7	27.0	30.4
Cyprus	:	1.0	1.0	:	26.5	28.3
Latvia	:	1.7	1.7	:	24.8	25.5
Lithuania	:	3.1	2.5	:	26.9	25.6
Luxembourg	1.7	1.2	1.3	33.4	35.8	43.5
Hungary	7.6	8.7	8.5	25.3	26.3	28.4
Malta	:	8.0	6.6	:	27.8	31.0
Netherlands	5.1	4.3	3.1	36.4	40.0	42.0
Austria	6.6	6.5	7.0	26.5	29.3	30.4
Poland	:	:	5.1	:	:	24.7
Portugal	4.2	3.6	3.3	22.0	19.7	23.1
Romania	:	5.1	5.5	:	11.3	14.6
Slovenia	9.2	8.8	8.7	20.8	23.1	26.2
Slovakia	:	6.8	9.6	:	25.3	24.9
Finland	7.2	7.4	6.8	37.4	39.1	41.1
Sweden	8.4	7.7	6.3	44.2	46.1	47.7
United Kingdom	7.9	7.1	5.5	37.3	40.5	43.0
Croatia	:	:	4.7	:	:	23.0
Turkey	:	:	3.6	:	:	12.8
Iceland	1.5	1.7	1.7	38.4	40.9	42.5
Norway	5.5	4.2	4.5	40.6	43.6	46.1
Switzerland	7.8	8.1	7.3	34.1	39.0	41.3

(1) Break in series, 2006, with the exception of Belgium and Luxembourg.

Source: Eurostat (tsc00011 and tsc00012)



14.2 Expenditure

Introduction

Research and development (R & D) lies at the heart of the EU's strategy to become the most competitive and dynamic knowledge-based economy by 2010; one of the original goals set by the Lisbon strategy was for the EU to increase its R & D expenditure to at least 3 % of GDP by 2010.

One area that has received notable attention in recent years is the structural difference in R & D funding between Europe and its main competitors. Policy-makers in Europe have tried to increase R & D business expenditure so that it is more in line with the ratios observed in Japan or the United States. In October 2008, the EU industrial R & D investment scoreboard was released⁽⁶⁾. This presents information on the top 1 000 companies in terms of R & D investors whose registered offices are in the EU. The report shows that R & D investment by the top 1 000 EU companies grew in 2007 at a faster pace than for non-EU competitors from either the United States or Japan; note there was a marked reduction in investment activity in the United States. Nevertheless, the data presented show that R & D investment by EU companies grew for the fifth consecutive year. The regional distribution of companies in the top 50 R & D investors in 2007 was split: 20 in the United States, 18 in the EU and 9 in Japan. Nokia was the EU company with the highest level of R & D investment in 2007, while Volkswagen and Daimler were also among the top 10 in the world, as was Roche (Switzerland).

In January 2006 the European Commission presented to the European Council its 2006 annual report on the revised Lisbon strategy, in the form of a communication – COM(2006) 30 – entitled 'Time to move up a gear – the new partnership for growth and jobs'⁽⁷⁾. One of the four areas for priority actions set out by the European Commission was to invest more in knowledge and innovation, and to increase the proportion of national wealth devoted to research and development through to 2010. The communication also referred to planned spending targets for R & D, stating that if these were met in the 18 countries that had set targets as part of their national plans then R & D expenditure was estimated to rise to 2.6 % of GDP by 2010. The communication also stressed that while all Member States appreciate the importance of the spread and effective use of information and communication technologies and environmental technologies, the link between the identified challenges and the measures proposed to address them in national plans was not always clear.

Definition and data availability

R & D is defined as comprising creative work undertaken on a systematic basis to increase the stock of knowledge (of man, culture and society) and the use of this stock to devise new applications. R & D is an activity where there are significant transfers of resources between units, organisations and sectors.

(6) http://iri.jrc.ec.europa.eu/research/docs/2008/Scoreboard_2008.pdf.

(7) http://eur-lex.europa.eu/LexUriServ/site/en/com/2006/com2006_0030en01.pdf.

R & D expenditure is a basic measure that covers intramural expenditure, in other words, all expenditures for R & D that are performed within a statistical unit or sector of the economy, whatever the source of the funds. Expenditures made outside the statistical unit or sector but in support of intramural R & D (for example, purchase of supplies for R & D) are included; both current and capital expenditures are included.

Gross domestic expenditure on R & D (often referred to as GERD) is composed of four separate sectors of performance: business enterprises, government, higher education, and private non-profit organisations. Expenditure data consider the research spend on the national territory, regardless of the source of funds; data are usually expressed in relation to GDP, otherwise known as R & D intensity.

Government budget appropriations or outlays for research and development (GBAORD) are the amount governments allocate towards R & D activities and include all appropriations allocated to R & D in central (or federal) government budgets. Provincial (or State) government is only included if the contribution is significant, whereas local government funds are excluded. Comparisons of GBAORD across countries give an impression of the relative importance attached to state-funded R & D.

Main findings

Gross domestic expenditure on R & D (GERD) for the EU-27 followed a generally positive evolution in the five years up to 2002. However, in 2003 the share of R & D expenditure in GDP decreased

and this pattern was repeated in 2004, although a small gain was recorded in 2005. The latest information available for 2006 showed that GERD was stable, accounting for 1.84 % share of GDP. As noted above, the EU-27's R & D expenditure tends to lag behind that of Japan and the United States. For comparison, Japanese GERD was 3.32 % of GDP in 2005, and the corresponding share in the United States for 2006 was 2.61 % (the Japanese share has followed an upward trend over the last decade for which data are available, while the trend of GERD in the United States was similar to that observed for the EU-27). As noted above, these differences are often explained as a result of the levels of expenditure within the business enterprise sector, where expenditure in the EU-27 was considerably lower (1.17 % of GDP) than in the United States (1.83 %) in 2006.

Among the Member States, the highest R & D intensity was recorded in Sweden and Finland, the only Member States where R & D intensity exceeded the 3 % goal set by the Lisbon strategy. In contrast, there were ten Member States that reported R & D expenditure accounting for less than 1 % of their GDP in 2006.

When focusing on the breakdown of gross domestic expenditure on R & D by source of funds in 2005, slightly more than half of the total (54.6 %) in the EU-27 came from the business enterprise sector, while just over one third (34.2 %) was derived from government, and a further 8.9 % came from abroad; industry-funded R & D accounted for 76.1 % of R & D expenditure in Japan and 64.9 % in the United States (2006).

**Table 14.6:** Gross domestic expenditure on R & D (GERD)

(% of GDP)

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
EU-27	1.76	1.78	1.79	1.84	1.86	1.87	1.88	1.87	1.83	1.84	1.84
Euro area	:	:	:	:	1.84	1.86	1.87	1.87	1.85	1.85	1.86
Belgium	1.77	1.83	1.86	1.94	1.97	2.08	1.94	1.88	1.87	1.84	1.83
Bulgaria (1, 2)	0.52	0.51	0.57	0.57	0.52	0.47	0.49	0.50	0.50	0.49	0.48
Czech Republic	0.97	1.08	1.15	1.14	1.21	1.20	1.20	1.25	1.25	1.41	1.54
Denmark	1.84	1.92	2.04	2.18	2.24	2.39	2.51	2.58	2.48	2.45	2.43
Germany	2.19	2.24	2.27	2.40	2.45	2.46	2.49	2.52	2.49	2.48	2.53
Estonia	:	:	0.57	0.69	0.61	0.71	0.72	0.77	0.86	0.93	1.14
Ireland	1.30	1.27	1.24	1.18	1.12	1.10	1.10	1.17	1.24	1.26	1.32
Greece	:	0.45	:	0.60	:	0.58	:	0.57	0.55	0.58	0.57
Spain	0.81	0.80	0.87	0.86	0.91	0.91	0.99	1.05	1.06	1.12	1.20
France (3, 4, 5)	2.27	2.19	2.14	2.16	2.15	2.20	2.23	2.17	2.15	2.12	2.09
Italy (3)	0.99	1.03	1.05	1.02	1.05	1.09	1.13	1.11	1.10	1.09	:
Cyprus	:	:	0.22	0.23	0.24	0.25	0.30	0.35	0.37	0.40	0.42
Latvia	0.42	0.38	0.40	0.36	0.44	0.41	0.42	0.38	0.42	0.56	0.70
Lithuania (1)	0.50	0.54	0.55	0.50	0.59	0.67	0.66	0.67	0.76	0.76	0.80
Luxembourg	:	:	:	:	1.65	:	:	1.66	1.63	1.57	1.47
Hungary (5)	0.65	0.72	0.68	0.69	0.78	0.92	1.00	0.93	0.88	0.94	1.00
Malta (5)	:	:	:	:	:	:	0.26	0.26	0.54	0.54	0.54
Netherlands (1)	1.98	1.99	1.90	1.96	1.82	1.80	1.72	1.76	1.78	1.74	1.67
Austria	1.59	1.69	1.77	1.88	1.91	2.04	2.12	2.23	2.22	2.43	2.49
Poland	0.65	0.65	0.67	0.69	0.64	0.62	0.56	0.54	0.56	0.57	0.56
Portugal	0.57	0.59	0.65	0.71	0.76	0.80	0.76	0.74	0.77	0.81	0.83
Romania	:	:	0.49	0.40	0.37	0.39	0.38	0.39	0.39	0.41	0.45
Slovenia	1.31	1.29	1.36	1.39	1.41	1.52	1.49	1.29	1.42	1.46	1.59
Slovakia (3)	0.91	1.08	0.78	0.66	0.65	0.64	0.57	0.57	0.51	0.51	0.49
Finland	2.52	2.70	2.86	3.16	3.34	3.30	3.36	3.43	3.45	3.48	3.45
Sweden (6)	:	3.47	3.55	3.57	:	4.18	:	3.86	3.62	3.80	3.73
United Kingdom	1.86	1.80	1.79	1.86	1.85	1.82	1.82	1.78	1.71	1.76	1.78
Croatia	:	:	:	:	:	:	1.04	1.05	1.13	1.00	0.87
Turkey	0.45	0.49	0.37	0.47	0.48	0.54	0.53	0.48	0.52	0.59	0.58
Iceland	:	1.83	2.00	2.30	2.67	2.95	2.95	2.82	:	2.77	:
Norway	:	1.63	:	1.64	:	1.59	1.66	1.71	1.59	1.52	1.52
Switzerland	2.65	:	:	:	2.53	:	:	:	2.90	:	:
Japan (1)	2.81	2.87	3.00	3.02	3.04	3.12	3.17	3.20	3.17	3.32	:
United States	2.53	2.56	2.61	2.65	2.73	2.74	2.64	2.67	2.58	2.61	2.61

(1) Break in series, 1996.

(2) Break in series, 1999.

(3) Break in series, 1997.

(4) Break in series, 2000.

(5) Break in series, 2004.

(6) Break in series, 2005.

Source: Eurostat (tsiir020), OECD

Table 14.7: Gross domestic expenditure on R & D by sector

(% of GDP)

	Business enterprise sector		Government sector		Higher education sector	
	2001	2006	2001	2006	2001	2006
EU-27	1.21	1.17	0.25	0.25	0.40	0.40
Euro area	1.19	1.18	0.27	0.27	0.39	0.39
Belgium	1.51	1.24	0.13	0.16	0.41	0.41
Bulgaria	0.10	0.12	0.31	0.31	0.06	0.05
Czech Republic	0.72	1.02	0.29	0.27	0.19	0.25
Denmark (1)	1.64	1.62	0.28	0.16	0.45	0.63
Germany	1.72	1.77	0.34	0.35	0.40	0.41
Estonia	0.24	0.51	0.10	0.15	0.36	0.46
Ireland	0.77	0.89	0.09	0.09	0.24	0.34
Greece	0.19	0.17	0.13	0.12	0.26	0.27
Spain (2)	0.48	0.67	0.15	0.20	0.28	0.33
France (3, 4, 5)	1.39	1.32	0.36	0.36	0.42	0.38
Italy (6)	0.53	0.54	0.20	0.19	0.35	:
Cyprus	0.05	0.09	0.12	0.12	0.07	0.18
Latvia	0.15	0.35	0.09	0.11	0.17	0.24
Lithuania	0.20	0.22	0.27	0.18	0.21	0.40
Luxembourg	:	1.25	0.14	0.19	0.01	0.04
Hungary (7)	0.37	0.48	0.24	0.25	0.24	0.24
Malta (4)	:	0.34	:	0.03	:	0.18
Netherlands (8)	1.05	0.96	0.25	0.24	0.49	:
Austria	:	1.66	:	0.13	:	0.65
Poland	0.22	0.18	0.19	0.21	0.20	0.17
Portugal	0.26	0.35	0.17	:	0.29	:
Romania	0.24	0.22	0.11	0.15	0.04	0.08
Slovenia	0.88	0.96	0.37	0.39	0.25	0.24
Slovakia	0.43	0.21	0.15	0.16	0.06	0.12
Finland	2.35	2.46	0.34	0.32	0.60	0.65
Sweden (9)	3.23	2.79	0.12	0.17	0.83	0.76
United Kingdom (3, 10)	1.19	1.10	0.18	0.18	0.41	0.46
Croatia	:	0.32	:	0.23	:	0.32
Turkey	0.18	0.21	0.04	0.07	0.32	0.30
Iceland	1.74	:	0.59	:	0.55	:
Norway	0.95	0.82	0.23	0.24	0.41	0.46
Switzerland	:	:	:	0.02	:	:
Japan	2.30	:	0.30	:	0.45	:
United States	1.99	1.83	0.31	0.29	0.33	0.37

(1) Break in series, government sector and higher education sector, 2002.

(2) Break in series, business enterprise sector, 2002.

(3) Break in series, business enterprise sector, 2001.

(4) Break in series, business enterprise sector, 2004.

(5) Break in series, higher education sector, 2004.

(6) Break in series, higher education sector, 2005.

(7) Break in series, government sector, 2004.

(8) Break in series, government sector, 2003.

(9) Break in series, business enterprise sector, government sector and higher education sector, 2005.

(10) Break in series, government sector, 2001.

Source: Eurostat (tsc00001), OECD



Table 14.8: Gross domestic expenditure on R & D by source of funds
(% of total gross expenditure on R & D)

	Business enterprise		Government		Abroad	
	2001 (1)	2006 (2)	2001 (1)	2006 (2)	2001 (1)	2006 (2)
EU-27	55.9	54.6	33.9	34.2	8.0	8.9
Euro area	57.2	56.7	35.7	35.0	5.8	6.8
Belgium	63.4	59.7	22.0	24.7	12.1	12.4
Bulgaria	27.1	27.8	66.2	63.9	5.7	7.6
Czech Republic	52.5	56.9	43.6	39.0	2.2	3.1
Denmark	61.4	59.5	28.2	27.6	7.8	10.1
Germany	65.7	67.6	31.4	28.4	2.5	3.7
Estonia	32.9	38.1	52.0	44.6	12.5	16.3
Ireland	66.7	59.3	25.6	30.1	6.0	8.9
Greece	33.0	31.1	46.6	46.8	18.4	19.0
Spain	47.2	47.1	39.9	42.5	7.7	5.9
France (3)	54.2	52.2	36.9	38.4	7.2	7.5
Italy	:	39.7	:	50.7	:	8.0
Cyprus	15.3	16.8	65.5	67.0	12.6	10.9
Latvia	18.3	32.7	50.0	58.2	31.7	7.5
Lithuania	37.1	26.2	56.3	53.6	6.6	14.3
Luxembourg	90.7	79.7	7.7	16.6	1.6	3.6
Hungary (4)	34.8	43.3	53.6	44.8	9.2	11.3
Malta	18.6	52.1	59.8	34.4	21.6	13.5
Netherlands	51.9	:	35.8	:	11.0	:
Austria	41.8	45.6	38.3	36.0	19.7	16.4
Poland	30.8	33.1	64.8	57.5	2.4	7.0
Portugal	31.5	36.3	61.0	55.2	5.1	4.7
Romania	47.6	30.4	43.0	64.1	8.2	4.1
Slovenia	54.7	59.3	37.1	34.4	7.2	5.8
Slovakia	56.1	35.0	41.3	55.6	1.9	9.1
Finland (5)	70.8	66.6	25.5	25.1	2.5	7.1
Sweden (6)	71.5	65.7	21.3	23.5	3.4	7.7
United Kingdom	45.5	45.2	28.9	31.9	19.7	17.0
Croatia	45.7	34.6	46.4	55.8	1.5	6.8
Turkey	44.9	46.0	48.0	48.6	0.8	0.5
Iceland	46.2	48.0	34.0	40.5	18.3	11.2
Norway	51.6	46.4	39.8	44.0	7.1	8.0
Switzerland	69.1	69.7	23.2	22.7	4.3	5.2
Japan	73.0	76.1	18.6	16.8	0.4	0.3
United States	66.6	64.9	27.5	29.3	:	:

(1) Malta and Croatia, 2002; Luxembourg and Switzerland, 2000.

(2) EU-27, euro area, Belgium, Bulgaria, Denmark, Germany, Greece, France, Italy, Cyprus, Luxembourg, Portugal, Sweden, Iceland, Norway and Japan, 2005; Switzerland, 2004.

(3) Break in series, 2004.

(4) Break in series for government sector, 2004.

(5) Break in series for abroad, 2005.

(6) Break in series, 2005.

Source: Eurostat (tsiir030), OECD

14.3 Patents

Introduction

Intellectual property rights and in particular patents provide a link between innovation, inventions and the marketplace. Applying for a patent makes an invention public, but at the same time gives it protection. A count of patents is one measure that reflects a country's inventive activity and also shows its capacity to exploit knowledge and translate it into potential economic gains. In this context, indicators based on patent statistics are widely used to assess the inventive and innovative performance of a country.

Patents are generally used to protect R & D results, but they are also significant as a source of technical information, which may prevent re-inventing and re-developing ideas because of a lack of information. However, the use of patents is relatively restricted within the EU – this may be for a number of reasons including: their relative cost; the overlap between national and European procedures; or the need for translation into foreign languages.

Most studies in this area show that innovative enterprises tend to make more use of intellectual property protection than companies that do not innovate. Enterprise size and the economic sector in which an enterprise operates are also likely to play an important role in determining whether an enterprise chooses to protect its intellectual property.

The European Council held in Lisbon in March 2000 called for the creation of a Community patent system to address shortcomings in the legal protection of inventions, while providing an incentive for investments in research and development and contributing to the competitiveness of the economy as a whole. In July 2000 the European Commission made a first proposal for the creation of a Community patent. This was discussed at various levels and despite various proposals and amendments for a Council Regulation on the Community patent during 2003 and 2004 no legal basis was forthcoming. In April 2007 the European Commission released a Communication entitled, 'Enhancing the patent system in Europe'⁽⁸⁾. It highlighted that the European patent system is more expensive, uncertain and unattractive, while underlining that the European Commission believes a more competitive and attractive Community patent system can be achieved, based upon the creation of a unified and specialised patent judiciary, with competence for litigation on European patents and future Community patents.

Definition and data availability

Following changes in the production of patent statistics at Eurostat in 2007, data shown on the Eurostat website are no longer fully comparable with data previously disseminated. From 2007 onwards, Eurostat's production of European Patent

(8) COM(2007) 165 final; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0165:FIN:en:PDF>.



Office (EPO) and United States Patent and Trademark Office (USPTO) data has been based almost exclusively on the EPO Worldwide Statistical Patent Database. The worldwide statistical patent database, also known as 'PATSTAT', was developed by the EPO in 2005, using their collection and knowledge of patent data.

European patent applications refer to applications filed directly under the European Patent Convention or to applications filed under the Patent Co-operation Treaty (PCT) and designated to the EPO (Euro-PCT), regardless of whether the patents are granted or not. For patent applications to the EPO all direct applications (EPO-direct) are taken into account, but among the PCT applications (applications following the procedure laid down by the PCT) made to the EPO, only those that have entered into the regional phase are counted. Patent applications are counted according to the priority date, i.e. the year in which they were filed anywhere in the world at the EPO and are broken down according to the International Patent Classification (IPC). Applications are assigned to a country according to the inventor's place of residence, using fractional counting if there are multiple inventors to avoid double counting. To normalise the data, the total number of applications at the EPO can be divided by the national population and expressed in terms of patent applications per million inhabitants.

High-technology patents are counted following the criteria established by the trilateral statistical report, where the subsequent technical fields are defined as high technology groups in accordance to the international patent classification (IPC): computer and automated business equipment; micro-organism and genetic engineering; aviation; communication technology; semiconductors; and lasers.

The European Patent Office (EPO) grants European patents for the contracting states to the European Patent Convention (EPC). There are currently 32 of these; the EU-27 Member States, Iceland, Liechtenstein, Switzerland, Monaco and Turkey. The falling trend between 2000 and 2005 is linked to the length of patenting procedures and should not be understood as a real decline in the patenting activity. For this reason the 2005 figures in Eurostat's reference database are flagged as provisional.

In contrast, the **United States Patent and Trademark Office (USPTO)** data refers to patents granted and data are recorded by year of publication as opposed to the year of filing. Patents are allocated to the country of the inventor, using fractional counting in the case of multiple inventor countries. The methodology used is not harmonised with that of Eurostat and therefore the comparison between EPO and USPTO patents data should be interpreted with caution.

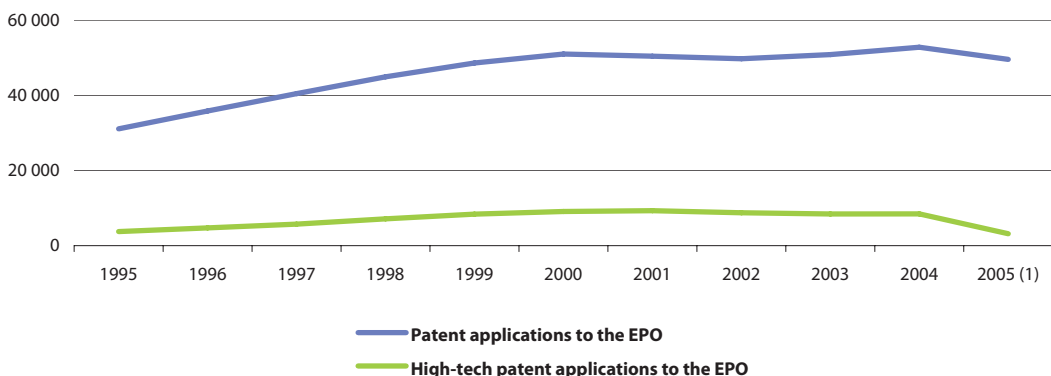
Main findings

EU-27 patent applications to the EPO increased significantly from 1995 to 2000 to reach 51 158, with the number of applications increasing, on average, by 11.6 % per annum. However, the steady upward trend then stagnated and there was little change in the number of applications through to another relative peak in 2004 (52 968 patent applications). The latest information available for 2005 showed a contraction in applications of 6.1 %, such that a total of 49 730 applications were made to the EPO.

Among the Member States, Germany had by far the highest number of patent applications to the EPO, some 22 219 in 2005 (which was 44.7 % of the EU-27 total). In relative terms, Germany was also the Member State with the highest number of patent applications per million inhabitants (269), followed by Finland (223) and Luxembourg (189).

EU-27 high-tech patent applications to the EPO represented an increasing share of total patent applications up until 2001 (when they accounted for 18.5 % of all applications). Their relative importance declined somewhat after this, as did their absolute number. From a high of 9 337 high-tech patent applications in 2001, there was a relatively slow reduction through to 2004, followed by a collapse in the number of high-tech applications in 2005, falling from 8 484 in 2004 to 3 192 a year later (-62.4 %). This pattern was observed across the majority of the Member States, in particular for the larger countries or in those countries with traditionally the highest propensity to make patent applications. Germany and Belgium registered the highest number of high-technology patent applications per million inhabitants in 2005, both just over 15, while Sweden and France were the only other Member States to record a ratio in double-digits. These figures were in stark contrast to those for the majority of the previous decade, when Finland and Sweden were clearly the most specialised countries.

Figure 14.3: Patent applications to the European Patent Office (EPO), EU-27
(number of applications)



(1) Estimate.

Source: Eurostat (tsc00009 and pat_ep_ntec), European Patent Office

Table 14.9: Patent applications to the European Patent Office (EPO) and patents granted by the USPTO

	Patent applications to the EPO			High technology patent applications to the EPO			Patents granted by the US Patent & Trademark Office (USPTO)		
	(number of applications)		(per million inhab.)	(number of applications)		(per million inhab.)	(number of patents granted)		(per million inhab.)
	2000	2005 (1)	2005 (1)	2000	2005 (2)	2005 (2)	1997	2002	2002 (3)
EU-27	51 158	49 730	101.3	9 110	3 192	6.5	28 565	20 394	42.1
Euro area	41 768	41 990	:	6 974	2 728	:	22 130	16 485	:
Belgium	1 288	1 302	124.6	198	159	15.2	842	451	43.8
Bulgaria	7	4	0.5	1	2	0.2	6	2	0.3
Czech Republic	67	71	7.0	3	9	0.8	39	44	4.3
Denmark	936	842	155.6	175	39	7.1	481	293	54.6
Germany	22 016	22 219	269.3	3 100	1 272	15.4	11 677	9 204	111.6
Estonia	6	7	5.2	1	1	0.4	4	3	2.2
Ireland	218	237	57.7	56	8	2.1	139	173	44.4
Greece	54	48	4.3	10	7	0.6	27	10	0.9
Spain	790	1 135	26.4	105	44	1.0	302	304	7.4
France	7 250	7 201	115.2	1 401	722	11.6	4 375	2 491	40.6
Italy	3 982	4 197	71.8	369	254	4.3	1 782	1 454	25.5
Cyprus	7	6	8.2	1	3	3.9	1	2	2.8
Latvia	7	12	5.2	1	1	0.3	2	2	0.9
Lithuania	5	2	0.6	1	1	0.2	3	1	0.3
Luxembourg	79	86	189.0	5	3	6.6	34	54	121.6
Hungary	121	64	6.3	26	2	0.2	71	26	2.6
Malta	5	9	22.4	:	1	2.5	1	2	5.1
Netherlands	3 418	2 695	165.3	1 015	133	8.2	1 451	1 156	71.8
Austria	1 175	1 477	180.0	106	55	6.7	582	555	68.8
Poland	43	108	2.8	4	15	0.4	31	39	1.0
Portugal	42	113	10.7	4	24	2.2	15	21	2.0
Romania	7	45	2.1	2	1	0.0	7	12	0.6
Slovenia	51	59	29.5	3	1	0.3	11	19	9.5
Slovakia	11	31	5.8	0	2	0.4	7	1	0.2
Finland	1 393	1 169	223.2	601	46	8.8	891	588	113.2
Sweden	2 270	1 370	152.0	532	107	11.9	1 875	797	89.5
United Kingdom	5 912	5 206	86.7	1 391	287	4.8	3 910	2 690	45.4
Croatia	15	24	5.4	:	1	0.1	11	20	4.5
Turkey	43	211	3.0	5	2	0.0	9	18	0.3
Iceland	36	21	73.0	7	3	9.2	14	7	24.4
Liechtenstein	23	21	606.9	2	1	28.9	17	17	507.1
Norway	395	401	87.1	49	4	1.0	298	141	31.2
Switzerland	2 694	2 929	395.0	339	189	25.5	1 519	1 088	150.0
Japan	21 356	20 099	157.3	5 040	2 515	19.7	35 083	32 942	258.5
United States	30 513	29 538	99.6	8 043	1 530	5.2	99 614	90 870	315.2

(1) Cyprus and Malta, 2004.

(2) Iceland, 2004; Cyprus, Lithuania and Malta, 2003.

(3) Estonia, 2001.

Source: Eurostat (tsc00009, tsii060, pat_ep_ntec, tsc00010, pat_us_ntot and tsii070), European Patent Office

14.4 Information society

Introduction

Information and communication technologies (ICT) are considered as critical for improving the competitiveness of European industry and, more generally, to meet the demands of its society and economy. ICT affects many aspects of everyday lives, at both work and in the home, and EU policies in this area range from the regulation of entire industrial sectors to the protection of an individual's privacy.

The policy framework for ICT is the i2010 initiative⁽⁹⁾ – ‘A European Information Society for Growth and Employment’ – which seeks to boost efficiency throughout the European economy by means of wider use of ICT. The initiative is designed to promote an open and competitive digital economy, research into information and communication technologies, as well as their application to improve social inclusion, public services and quality of life. Indeed, at the heart of the policy is a desire to ensure that social and geographical differences are overcome, thus creating a fully-inclusive digital society. The i2010 initiative has three main priorities:

- creating a Single European Information Space, which promotes an open and competitive internal market for information society and media services;
- stimulating the information society – to strengthen investment in innovation and research in ICT;
- exploiting the benefits of ICT – to foster inclusion, better public services and quality of life through the use of ICT.

Digital literacy and e-skills are crucial to increasing participation in the information society. The 2007 results of Eurostat's household survey of information and communication technologies presented in this subchapter include findings on the levels of computer skills of the population. Additional data on Internet skills of the population and demand for e-skilled labour by enterprises can be found in the Eurostat database. According to a Communication from the European Commission on ‘e-skills for the 21st century: fostering competitiveness, growth and jobs’⁽¹⁰⁾, there is evidence of skills shortages across Europe, with a lack of up to half a million people with advanced networking technology skills, while enterprises report a skills shortfall for ICT practitioners, particularly in ICT strategy, security and new business solutions. The i2010 benchmarking framework⁽¹¹⁾ has addressed specific modules on e-skills in the 2007 surveys.

After undergoing a mid-term review, an updated i2010 strategy was presented in April 2008, addressing key challenges for the period 2008-2010. This was followed by a European Commission communication on future networks and the Internet⁽¹²⁾ which outlined the full breadth of the social and economic potential of the Internet in the future, based

(9) http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm.

(10) COM(2007) 496 final, http://ec.europa.eu/enterprise/ict/policy/ict-skills/2007/COMM_PDF_COM_2007_0496_F_EN_ACTE.pdf.

(11) For more information: http://ec.europa.eu/information_society/eeurope/i2010/benchmarking/index_en.htm.

(12) COM(2008) 594 final; http://ec.europa.eu/information_society/eeurope/i2010/docs/future_internet/act_future_networks_internet_en.pdf.



on the premise of a high-speed Internet available to all, internationally open and competitive, secure and safe to use, with transparent and effective governance. These fundamental conditions of accessibility, openness, transparency and security form the basis of the European Commission's short-term agenda for the Internet of the future, as summarised by six actions:

- the construction of high-speed internet infrastructures that are open to competition and give consumers real choices.
- promoting access for all to a good-quality Internet connection at an affordable price.
- keeping the Internet open to competition, innovation and consumer choice.
- launching a debate on the design and development of the Internet of the future.
- providing clear guidelines on the implementation of existing rules on data protection and a coherent strategy for a secure Internet of the future.
- taking into account the crucial role played by international policy, regulatory dialogue and research cooperation in all these developments.

Broadband technologies are considered to be of major importance when measuring access and use of the Internet as they offer users the possibility to rapidly transfer large volumes of data and keep their access line open; the take-up of broadband is considered a key indicator within the domain of ICT policy making. Widespread access to the Internet via broadband is seen as essential for the

development of advanced services on the Internet, such as eBusiness, eGovernment or eLearning. Broadband growth has continued in recent years and 42 % of all households in the EU-27 have broadband. Digital Subscriber Lines (DSL) remain the main form of delivery for broadband technology, although alternatives such as cable, satellite, fibre optics and wireless local loops are seeing more widespread use.

Definition and data availability

Statisticians are well aware of the challenges posed by rapid technological change in areas related to the Internet and other new means of ICT. As such, there has been a considerable degree of evolution in this area, with statistical tools being adapted to satisfy new demands for data. Statistics within this domain are re-assessed on an annual basis in order to meet user needs and reflect the rapid pace of technological change.

The data presented within this section are from **Eurostat's surveys on information and communication technologies in households and by individuals, and surveys on information and communication technologies in enterprises and e-commerce**. These annual surveys on ICT usage in enterprises and in households/by individuals are carried out by National Statistical Institutes. Results are used to benchmark ICT-driven developments. While the surveys initially concentrated on access and connectivity issues, their scope has subsequently been extended to cover a variety of subjects (including, for example, e-government, e-skills) and socio-economic breakdowns,

such as regional diversity, gender specificity, age, educational differences and the individual's employment situation in the household survey or a breakdown by size (small, medium, large) in the enterprise survey. The scope of the surveys with respect to different technologies is also adapted so as to cover new product groups and means of delivering communication technologies to end-users (enterprises and households).

Households are defined as having at least one member in the age group 16-74 years old. **Internet access of households** refers to the percentage of households with an Internet access, so anyone in the household could use the Internet at home, if desired, even if just to send an e-mail. **Internet users** are defined as all individuals aged 16-74 who had used the Internet in the previous three months. **Regular Internet users** are individuals who used the Internet, on average, at least once a week in the three months prior to the survey (in general, during the first quarter of 2007).

The most commonly used technologies to access the Internet are divided between broadband and dial-up access. **Broadband includes digital subscriber lines (DSL)** and uses technology that transports data at high speeds. **Broadband lines** are defined as having a capacity equal to or higher than 144 kbit/s. A **dial-up access** using a modem can be made over a normal or an ISDN telephone line. Due to its limited bandwidth it is often referred to as narrowband.

A **computer** is defined as a personal computer that is run using one of the main operating systems (Macintosh, Linux or Microsoft); handheld computers or palm-tops (PDAs) are also included. Individuals were asked if they have experiences in carrying out selected activities in order to measure their level of **basic computer skills**. Six computer-related items were applied: copied or moved a file or folder; used copy and paste tools to duplicate or move information within a document; used basic arithmetic formulas to add, subtract, multiply or divide figures in a spreadsheet; compressed files; connected and installed new devices, e.g. a printer or a modem; wrote a computer program using a specialised programming language. The level of an individual's skills was determined as: low level: 1 or 2 activities carried out; medium level: 3 or 4 activities carried out; high level: 5 or 6 activities carried out.

The **ordering of goods and services by individuals** includes confirmed reservations for accommodation, purchasing financial investments, participation in lotteries and betting, Internet auctions, as well as information services from the Internet that are directly paid for. Goods and services that are obtained via the Internet for free are excluded. Orders made by manually written e-mails are also excluded. The indicator shows the percentage of individuals aged 16-74 who have used the Internet, in the 12 months prior to the survey, for ordering goods or services.



The survey on ICT usage in enterprises covers enterprises with 10 or more persons employed. Its activity coverage is restricted to those enterprises whose principal activity is within NACE Sections D, F, G, I and K and Groups 55.1, 55.2, 92.1 and 92.2, in other words manufacturing, construction, distributive trades, hotels and accommodation, transport and communication, real estate, renting and business activities, motion picture, video, radio and television activities.

Internet access among enterprises is measured in terms of the proportion of the total number of persons employed having access to the Internet or access via a broadband connection; this indicator is considered as a proxy for productivity within enterprises. The **availability of broadband** is measured by the percentage of enterprises that are connectable to an exchange that has been converted to support xDSL-technology, to a cable network upgraded for Internet traffic, or to other broadband technologies.

The indicator measuring enterprise **turnover from e-commerce** is shown as a percentage of total turnover. The indicator is calculated as the enterprises' receipts from sales through the Internet as percentage of the total turnover. Sales through other networks are not included, leaving out for instance EDI-based sales. The year given relates to the survey year. The e-commerce data relates to the year prior to the survey. **E-commerce** is defined as ordering or selling goods and services over computer mediated networks. Online purchases or orders received exclude those relating to manually typed e-mail

purchases or orders received. The indicator on enterprises having **received orders or made purchases online** covers online selling via Internet and EDI or other networks within the previous year. Only enterprises buying/selling more than 1 % online are included.

Indicators relating to **online access to public services** show the percentage of 20 selected basic services which are fully available online, in other words, for which it is possible to carry out full electronic case handling. For example, if in a country 13 of the 20 services were measured as being 100 % available online and one service was not relevant (e.g. does not exist), the indicator is 13/19 which is 68.4 %. Measurement is based on a sample of URLs of public websites agreed with Member States as relevant for each service.

The indicators concerning the use of **e-government services** are based on usage during the three months prior to the survey for individuals and the year prior to the survey for enterprises. E-government services concern interaction with public authorities in one or more of the following activities: obtaining information from public authority websites, downloading of official forms, submitting completed forms and e-procurement (for the enterprise survey).

Data on **information technology (IT) expenditure** covers expenditure for IT hardware, equipment, software and other services.

Main findings

During the last decade, information and communication technologies (ICTs) have become widely available to the general public, in terms of accessibility as well as cost. The increasing use of these technologies is such that in 2007 for the first time, a majority (54 %) of households in the EU-27 had an Internet access. Among the Member States, a high proportion (83 %) of households in the Netherlands had an Internet access in 2007, while Sweden, Denmark and Luxembourg reported shares of at least 75 %.

Widespread and affordable broadband access would appear to be one means of promoting the knowledge-based and informed society. The vast majority of households in the EU-27 accessed the Internet using a broadband connection, some 42 % compared with 14 % of households that had a dial-up or ISDN Internet access. Romania and Greece were the only Member States where a higher proportion of households used a dial-up or ISDN connection to access the Internet. Some 81% of individuals living in a household in the EU-27 with broadband connection accessed the Internet regularly (at least once a week), compared with 63 % of individuals living in households with Internet access but no broadband. Just over four fifths (81 %) of all Internet users aged 16 to 74 in the EU-27 declared they accessed Internet at home in 2007; while 43 % of Internet users accessed the Internet from their place of work.

Results on the supply of e-skills from 2007 show that three quarters or more than three quarters of the population in Denmark, Luxembourg, the Netherlands, Sweden and Germany had basic computer skills. The lowest proportions were registered in Bulgaria (32 %) and Romania

(29 %). The Member States which had the highest proportions of individuals with a high level of computer skills were Denmark and Luxembourg.

The proportion of individuals aged 16-74 in the EU-27 who used the Internet at least once in the last 12 months to buy or order goods or services for private use was 30 % in 2007. Between 2006 and 2007, all EU Member States registered an increase in e-shopping. In 2007, more than half of all individuals in Denmark, Germany, the Netherlands, Sweden and the United Kingdom had bought or ordered goods or services over the Internet in the last 12 months. On the other hand, less than 5 % of individuals had shopped over the Internet in Bulgaria and Romania.

The provision of fully-online e-government services in EU-27 reached a level of 59 % in 2007. Considering the available results from previous years, there has been a considerable increase during the last years. The EU-25 average grew by 11 percentage points from 2006 to 2007. Austria is the only Member State with an online availability of 100 %, i.e. all considered government services can be completely managed via the Internet. Malta, Portugal, Slovenia and the United Kingdom exceed a level of 75 % of the considered government services, whereas Poland and Bulgaria achieve a maximum of 25 % of government services fully available online. It seems that political prioritisation of e-government services together with a moderate size and a more centrally organised administration enable a more rapid progress in e-government online availability.

Almost one third (30 %) of individuals made use of e-government initiatives to access a range of public services online in 2007, mainly for obtaining information,



but increasingly for downloading and filling in forms (such as tax returns). The Nordic Member States, the Netherlands and Luxembourg stood out, as a majority of individuals in each of these countries made use of such e-government services.

Almost all (97 %) of the workforce among enterprises with ten or more full-time persons employed in the EU-27 had an Internet connection in 2007 and more than 90 % of these accessed the Internet using a broadband connection. An average of 17 % of enterprises with ten or more full-time persons employed had in 2006 the facility to allow remote persons to connect to their IT systems from home; this figure grew considerably as a function of the average size of an enterprise, rising to a 55 % share among those enterprises employing 250 or more persons. Enterprises in the Nordic Member States, the Netherlands and the United Kingdom reported the highest propensity to make use of remote access to their IT systems, irrespective of the size of enterprise.

Around two thirds (65 %) of enterprises made use of e-government services: a majority using e-government services to obtain information and to download forms (57 % and 58 % respectively), while 45 % of enterprises returned filled in forms using e-government services. The take-up of e-government services among enterprises in 2007 reflected the relatively high levels of take-up among households in countries like Denmark, Luxembourg, the Netherlands or Finland. Several other countries – including Ireland, Greece, Italy, Austria, Slovenia and Slovakia – also recorded relatively high take-up of e-government services by enterprises, in contrast to household take-up. Bulgaria, Latvia and Romania were the only countries to report a minority of enterprises making use of e-government services.

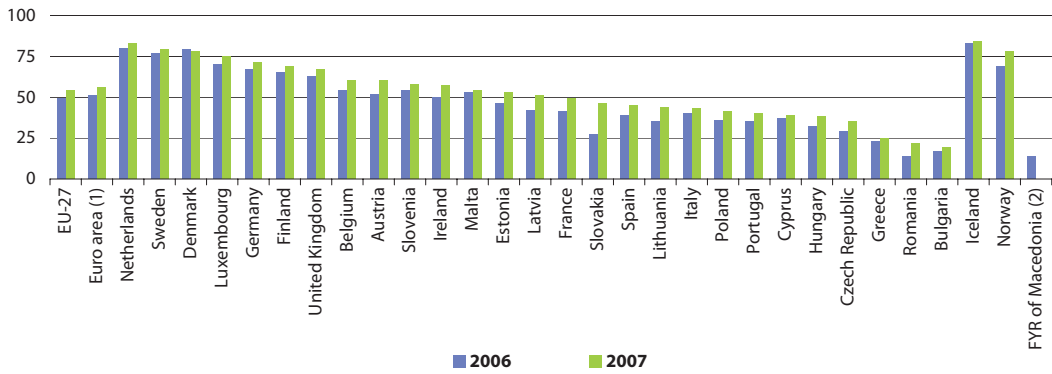
Some 15 % of enterprises in the EU-27 received orders online during 2007, which was roughly half the proportion of enterprises (29 %) that used the Internet to place orders to purchase goods or services. The general pattern across Member States is one where a considerably higher proportion of enterprises have made purchases online when compared with those that have received orders online (probably reflecting the greater complexity of setting up an online selling system compared with making purchases). One third of all enterprises in Denmark received orders online in 2007, while corresponding shares were equal to or above one quarter in the United Kingdom, Ireland, Sweden and the Netherlands. In contrast, a majority of enterprises in Ireland and Germany (55 % and 52 % respectively) made purchases online in 2007, while upwards of 40 % of all enterprises in the United Kingdom, Sweden, Belgium and Austria made purchases online.

The proportion of total turnover accounted for by e-commerce via the Internet equated to 4.2 % in the EU-27 in 2007, with only a handful of countries – Ireland, the United Kingdom, Spain and Lithuania – reporting that e-commerce represented more than 5 % of total turnover.

Compared with its main competitors, the EU has a relatively low share of ICT expenditure when expressed as a share of GDP. Indeed, expenditure on information technology represented 2.7% of GDP in the EU-27 in 2006, compared with 3.4 % in Japan and 3.3 % in the United States.

Figure 14.4: Internet access of households

(% of all households)



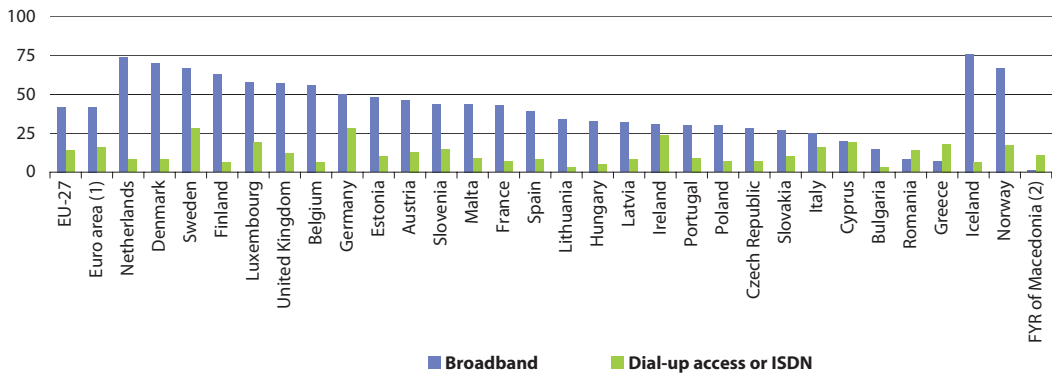
(1) EA-12 in 2006; EA-13 in 2007.

(2) Not available for 2007.

Source: Eurostat (tsiir040)

Figure 14.5: Internet access of households by type of connection, 2007

(% of all households)



(1) EA-13 instead of EA-15.

(2) 2006.

Source: Eurostat (tin00073)

**Table 14.10:** Place of Internet use by individuals, 2007

(% of individuals aged 16 to 74 who used the Internet in the last three months)

	Home	Place of work (other than home)	Place of education	Neighbour, friend or relative's house	Other place
EU-27	81	43	13	21	12
Euro area (1)	81	43	11	23	12
Belgium	89	34	10	8	5
Bulgaria	71	38	12	6	16
Czech Republic	76	42	19	15	6
Denmark	95	52	13	17	8
Germany	89	42	10	18	10
Estonia	83	43	18	15	7
Ireland	77	39	11	5	9
Greece	62	44	11	12	17
Spain	74	45	13	25	21
France	72	40	8	36	11
Italy	78	48	13	22	16
Cyprus	72	54	11	15	9
Latvia	77	40	19	15	12
Lithuania	80	40	24	23	13
Luxembourg	92	44	11	11	3
Hungary	74	40	21	23	11
Malta	92	40	9	9	3
Netherlands	97	50	13	16	5
Austria	82	48	10	8	5
Poland	74	33	23	23	13
Portugal	68	43	21	32	20
Romania	67	34	21	12	9
Slovenia	85	53	18	25	16
Slovakia	60	51	21	20	15
Finland	89	49	21	35	20
Sweden	91	52	14	22	12
United Kingdom	87	45	13	19	11
FYR of Macedonia (2)	32	17	19	9	54
Iceland	93	63	30	48	30
Norway	92	56	15	18	13

(1) EA-13 instead of EA-15.

(2) 2006.

Source: Eurostat (isoc_pibi_pai)

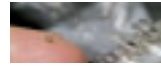
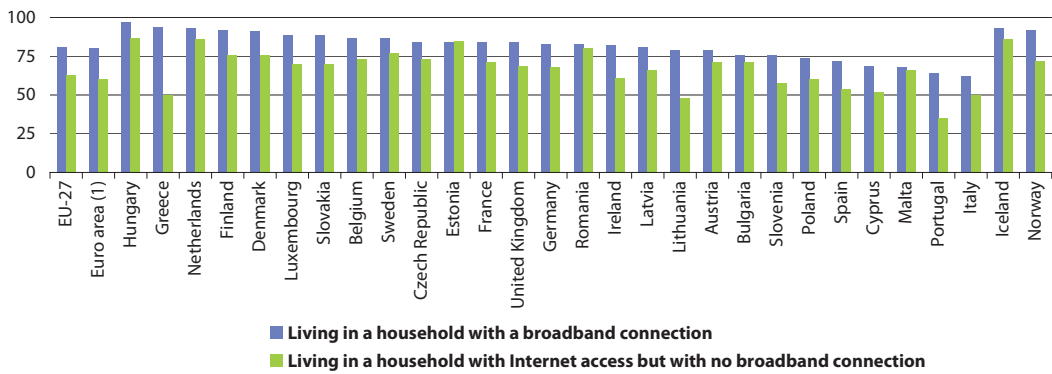


Figure 14.6: Individuals regularly using the Internet by type of connection, 2007

(% of all individuals aged 16 to 74)

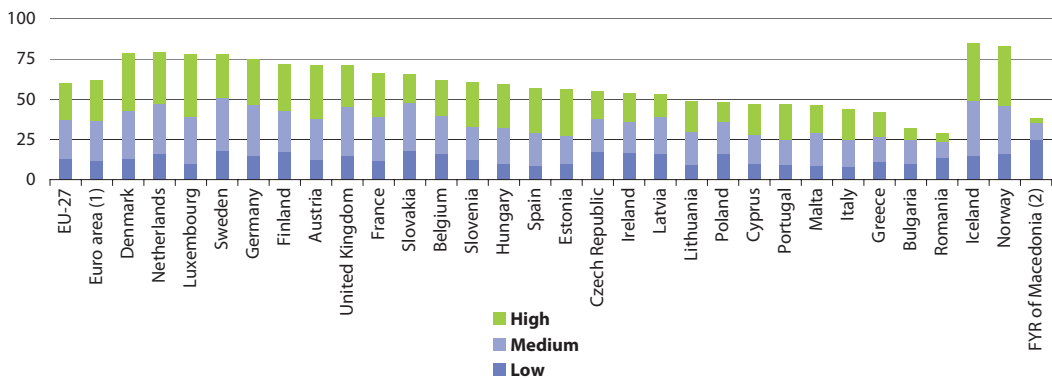


(1) EA-13 instead of EA-15.

Source: Eurostat (tin00061)

Figure 14.7: Individuals' level of computer skills, 2007

(% of all individuals aged 16 to 74)



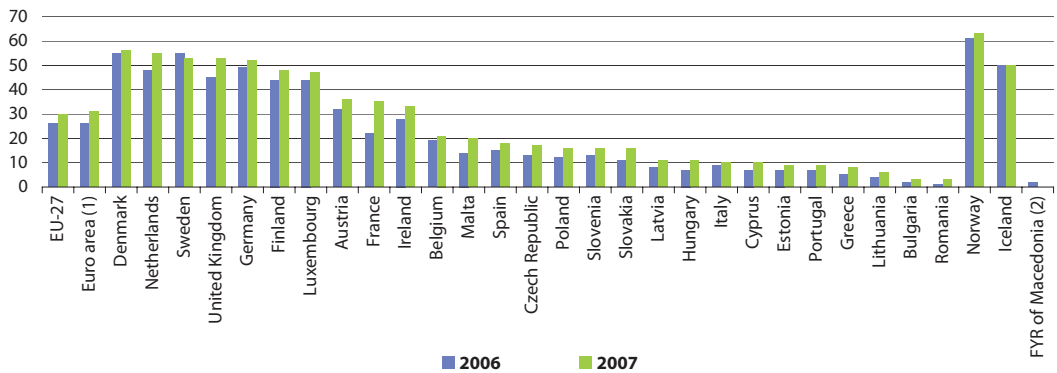
(1) EA-13 instead of EA-15.

(2) 2006.

Source: Eurostat (tsdsc460)

Figure 14.8: Individuals who ordered goods or services over the Internet for private use in the last twelve months

(% of all individuals aged 16 to 74)



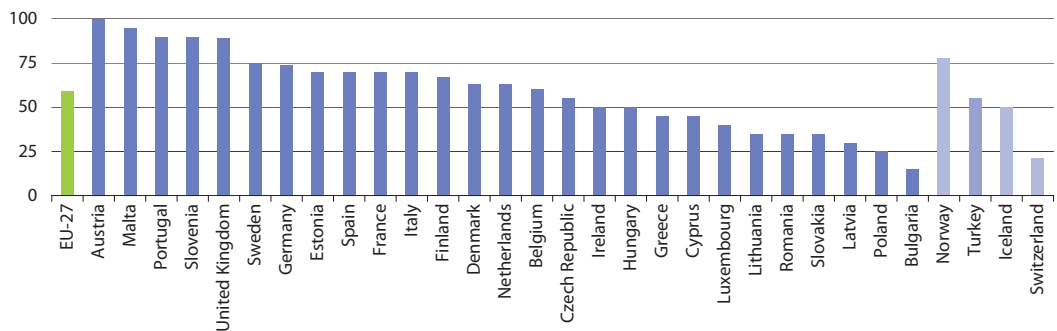
(1) EA-12 in 2006; EA-13 in 2007.

(2) Not available for 2007.

Source: Eurostat (isoc_ec_ibuy)

Figure 14.9: E-government on-line availability, 2007

(% of online availability of 20 basic public services)



Source: Eurostat (tsiir120), Directorate-General Information Society and Media

Table 14.11: Individuals using the Internet for interacting with public authorities, 2007

(% of all individuals aged 16 to 74)

	E-government usage by individuals			Individuals using the Internet for interacting with public authorities		
	Total	Male	Female	Obtaining information	Downloading official forms	Returning filled in forms
EU-27	30	33	28	27	18	13
Euro area (1)	33	36	30	30	19	13
Belgium	23	26	20	21	11	8
Bulgaria	6	6	7	4	4	3
Czech Republic	16	17	15	14	8	4
Denmark	58	62	55	58	37	33
Germany	43	47	39	39	26	17
Estonia	30	29	32	27	21	20
Ireland	32	34	31	26	22	19
Greece	12	14	9	10	4	5
Spain	26	29	24	25	14	8
France	41	42	40	37	24	18
Italy	17	19	14	15	11	5
Cyprus	20	21	19	18	13	10
Latvia	18	16	20	17	7	6
Lithuania	18	17	19	18	12	11
Luxembourg	52	62	41	44	38	21
Hungary	25	25	25	22	19	14
Malta	25	28	21	22	17	9
Netherlands	55	61	49	49	30	33
Austria	27	32	23	24	19	13
Poland	15	15	15	12	9	4
Portugal	19	22	17	17	13	13
Romania	5	6	5	4	3	2
Slovenia	30	29	31	28	15	6
Slovakia	24	23	24	20	15	8
Finland	50	51	50	43	31	17
Sweden	53	55	50	47	29	24
United Kingdom	38	42	34	33	22	18
FYR of Macedonia (2)	15	19	11	12	5	2
Turkey (3)	6	8	4	5	2	1
Iceland	59	63	54	54	33	19
Norway	60	65	55	55	33	26

(1) EA-13 instead of EA-15.

(2) 2006.

(3) 2005.

Source: Eurostat (tsiir130 and tin00064)



Table 14.12: Proportion of enterprises that have remote employed persons who connect to IT systems from home, 2006 (1)

(% of enterprises)

	Total (10+ persons employed)	Small (10-49 persons employed)	Medium (50-249 persons employed)	Large (250+ persons employed)
EU-27	17	13	30	55
Euro area (2)	15	11	30	57
Belgium	27	21	50	71
Bulgaria	9	9	10	17
Czech Republic	19	15	31	48
Denmark	53	46	81	95
Germany	21	15	39	65
Estonia	22	18	34	53
Ireland	25	20	38	59
Greece	16	14	25	52
Spain	8	5	17	40
France	:	:	:	:
Italy	3	2	7	23
Cyprus	14	10	28	62
Latvia	7	5	12	27
Lithuania	12	11	13	30
Luxembourg	19	16	25	66
Hungary	10	8	16	36
Malta	:	:	:	:
Netherlands	35	29	56	85
Austria	20	16	37	64
Poland	4	3	8	15
Portugal	9	7	21	49
Romania	7	6	9	20
Slovenia	26	23	32	65
Slovakia	13	12	17	34
Finland	32	24	56	77
Sweden	39	34	59	84
United Kingdom	32	26	49	79
Iceland	47	42	67	66
Norway	49	44	78	94

(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.

(2) EA-12 instead of EA-15.

Source: Eurostat (tin00082 and isoc_ci_tw_e)

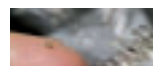


Table 14.13: Enterprises using the Internet for interacting with public authorities, 2007 (1)
(% of enterprises)

	E-government usage by enterprises	Obtaining information	Downloading official forms	Returning filled in forms
EU-27	65	57	58	45
Euro area (2)	68	58	60	47
Belgium	51	44	35	37
Bulgaria	45	40	36	29
Czech Republic	73	70	65	34
Denmark	88	83	83	61
Germany	56	44	49	43
Estonia	76	74	71	58
Ireland	89	79	82	69
Greece	82	71	70	77
Spain	58	53	53	38
France	69	61	64	59
Italy	84	74	70	35
Cyprus	54	53	43	14
Latvia	45	42	41	26
Lithuania	76	71	75	60
Luxembourg	85	76	81	35
Hungary	55	51	52	44
Malta	77	74	68	49
Netherlands	81	67	69	73
Austria	81	60	75	54
Poland	64	53	56	56
Portugal	72	66	65	66
Romania	42	39	36	20
Slovenia	83	78	76	61
Slovakia	85	78	80	56
Finland	94	88	91	78
Sweden	79	77	76	55
United Kingdom	54	52	49	40
Croatia	51	45	48	33
Iceland (3)	95	85	79	81
Norway	71	65	66	61

(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2. The year given relates to the survey year. The e-government data relates to the year prior to the survey.

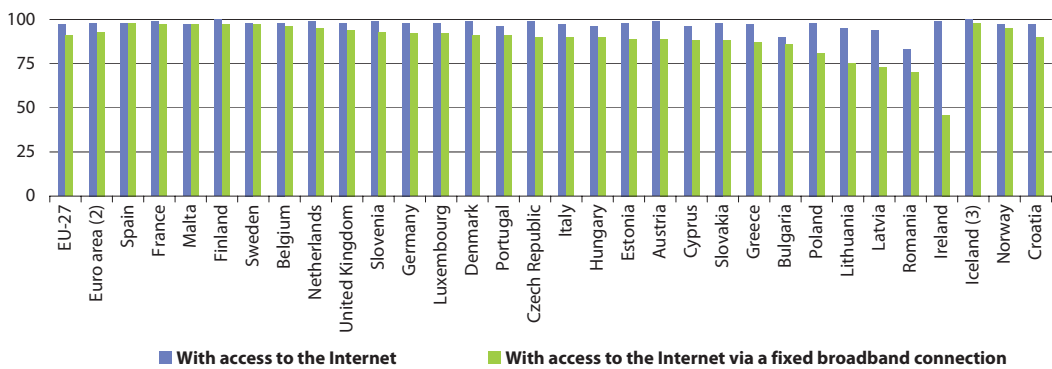
(2) EA-13 instead of EA-15.

(3) 2006.

Source: Eurostat (tsiir140 and tin00065)

Figure 14.10: Internet access and broadband connections among enterprises, 2007 (1)

(% of persons employed)



(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2.

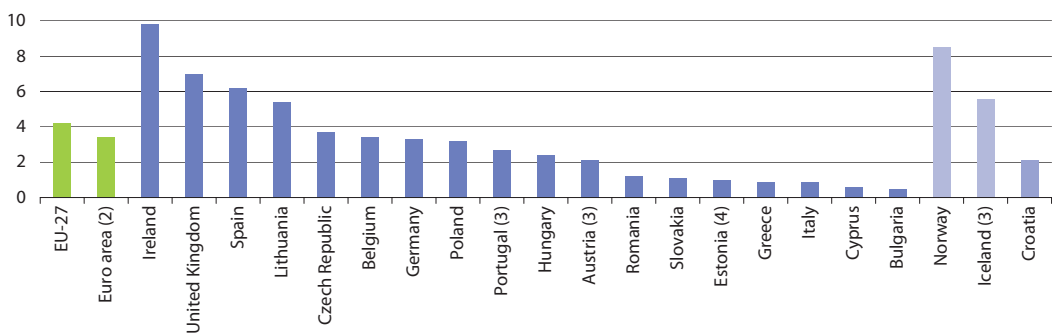
(2) EA-13 instead of EA-15.

(3) 2006.

Source: Eurostat (isoc_ci_in_p and isoc_ci_it_p)

Figure 14.11: Proportion of enterprises' total turnover from e-commerce via Internet, 2007 (1)

(%)



(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, G, I and K or NACE Groups 55.1 and 55.2; Denmark, France, Latvia, Luxembourg, Malta, the Netherlands, Slovenia, Finland and Sweden, not available.

(2) EA-13 instead of EA-15.

(3) 2006.

(4) 2005.

Source: Eurostat (tsiir100)

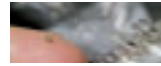


Figure 14.12: Enterprises having received orders/made purchases on-line, 2007 (1)

(% of enterprises)



(1) Enterprises with 10 or more full-time persons employed; enterprises that have their main activity in NACE Sections D, F, G, I and K or NACE Groups 55.1, 55.2, 92.1 and 92.2; France, not available.

(2) EA-13 instead of EA-15.

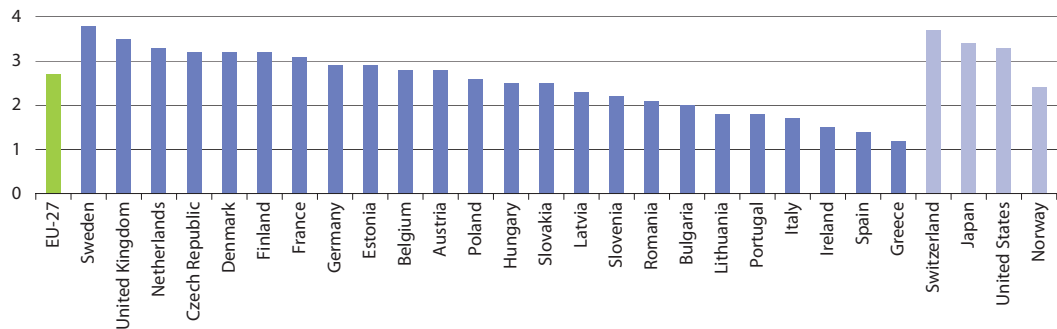
(3) 2006.

(4) 2005.

Source: Eurostat (tin00068 and isoc_ec_ebuy)

Figure 14.13: Information technology expenditure, 2006 (1)

(% of GDP)



(1) Cyprus, Luxembourg and Malta, not available.

Source: Eurostat (tsiir090), European Information Technology Observatory (EITO)



14.5 Telecommunications

Introduction

Telecommunication networks and services are the backbone of Europe's developing information society. Individuals, enterprises and public organisations alike have come to rely ever more on convenient, reliable networks and services for a variety of services.

The European telecommunications sector was historically characterised by public service, monopoly providers, often run in conjunction with postal services. Liberalisation moves began in the first half of the 1980s and, at first, concerned value added services or business users, while basic services were left in the hands of monopoly providers. By 1998, telecommunications were, in principle, fully liberalised across all of the Member States. The liberalisation of telecommunication markets has led to considerable reductions in prices. This may, in part, reflect the introduction of competition into a number of markets that were previously the domain of incumbent, monopoly suppliers, as well as reflecting technological changes that have increased capacity and made it possible to communicate not only by voice, but also over the Internet. Market regulation has nonetheless continued, and the European Commission oversees this to ensure that consumers benefit. Regulation continues to monitor the significant market power of former monopolies, ensure universal service and protect consumers, especially those social groups that may otherwise face exclusion, through overseeing the correct implementation and enforcement of Directives.

On 30 June 2007, a new set of rules on roaming entered into force. These foresee that people travelling within the EU are able to phone across borders at more affordable and transparent prices. The Roaming Regulation⁽¹³⁾ put in place a set of maximum prices for phone calls made and received while abroad (Eurotariff); these maximum prices apply to all consumers unless they opt for special packages offered by operators. The European Commission and national regulators have closely monitored price developments for text messages and data services. On the basis of this monitoring, a review was conducted which came to the conclusion that competition has not encouraged mobile operators to voluntarily reduce very high roaming charges for text messages. The European Commission therefore proposed on 23 September 2008:

- to bring down prices for text messages sent while travelling in another EU country;
- to ensure that consumers are kept informed of the charges that apply for data roaming services;
- to introduce a Euro-SMS Tariff from 1 July 2009 so that sending an SMS from abroad would cost no more than 11 cents (excluding VAT), while receiving an SMS in another EU country would remain free of charge;

(13) Regulation (EC) No 717/2007 of the European Parliament and of the Council of 27 June 2007 on roaming on public mobile telephone networks within the Community and amending Directive 2002/21/EC; <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2007:171:0032:0040:EN:PDF>.

- to improve transparency so that customers travelling to another Member State should receive an automated message of the charges that apply for data roaming services upon arrival; while from 1 July 2010, operators should provide customers with the opportunity to determine in advance how much they want to spend before a data roaming service is 'cut-off';
- to restrict to EUR 1 per megabyte wholesale data roaming fees, so these are more predictable for operators;
- to reduce further the cost of Eurotariff voice calls, with the price for making calls decreasing from 43 cents on 1 July 2009, to 40 cents, 37 cents and 34 cents in each of the subsequent years, while the price of receiving a call would decrease from 19 cents on 1 July 2009 to 16 cents, 13 cents and 10 cents.

Definition and data availability

Eurostat's data collection in relation to **telecommunications statistics** is conducted through the use of a predefined questionnaire (TELECOM), which is sent on annual basis to the national statistical institutes. They collect information from their relevant regulatory authorities and send the completed questionnaires back to Eurostat.

Main telephone lines are the traditional way of connecting to communication networks. They are usually used for voice telephony, but may also be used for accessing the Internet via a modem or dial-up connection. The rapid growth of more

powerful means to access the Internet (broadband) and mobile communications has eroded somewhat the market for traditional fixed telecommunication networks.

Indicators presented in relation to market share refer to fixed-line telecommunications and mobile telephony. The market share of the **incumbent for fixed-line telephony** is defined as the enterprise active in the market just before liberalisation and is calculated on the basis of retail revenues. Indicators relating to the **mobile market** refer to the number of subscriptions to public cellular mobile telecommunication systems and also include active pre-paid cards. Note that an increasing number of people have multiple mobile subscriptions (for example, for private and work use, or for use in different countries).

Data on **expenditure for telecommunications** covers hardware, equipment, software and other services. The data are not collected by Eurostat; further methodological information is available at: <http://www.eito.com/>.

Telecommunications prices are based on the price (including VAT) in euro of a 10-minute call at 11 am on a weekday in August, based on normal rates. Three markets are presented, namely a **local call** (3 km), a **national long distance call** (200 km) and an **international call** (to the United States). The data are not collected by Eurostat; further methodological information is available at: <http://www.teligen.com/>.



Main findings

Telecommunications expenditure accounted for 3.0 % of GDP in the EU-27 in 2006, compared with 2.1 % in the United States and 4.2 % in Japan. The highest relative levels of expenditure were generally recorded in those Member State that joined the EU since 2004 (Cyprus and Malta, not available), in particular in the Baltic Member States, Bulgaria and Romania.

Although overall expenditure on telephony has increased, the proportion accounted for by ex-monopoly providers has generally been reduced, as the share of the total telecommunication market accounted for by fixed-line voice operations has shrunk, whereas growth has been concentrated in mobile markets and other data services. The incumbents in fixed telecommunications markets across the EU-25 accounted for 72 % of local calls in 2005, 66 % of national calls and 56 % of international calls. In contrast, the share of incumbents in the mobile market was relatively low at 39 % in 2006.

The average number of mobile subscriptions per 100 inhabitants stood at 106 in the EU-27 in 2006, and surpassed parity in 17 of the Member States, where there were more subscriptions than inhabitants.

The price of telecommunications fell between 2004 and 2006 in a large number of Member States. Price reductions were most apparent for national long distance and international calls (defined here as calls to the United States), as on average in the EU-25 the price of a national long distance call was reduced by almost 20 % overall between 2004 and 2006, while the price of an international call was reduced by almost 16 %. In comparison, there was a modest reduction in the price of a local call, which was reduced by less than 3 %.

The prices of local, national long distance or international calls varied greatly across the Member States in 2006. Local and national distance calls were most expensive in Slovakia, while the price of international calls was highest in Latvia. The cheapest tariff for local calls was found in Spain, for national long distance calls in Cyprus, and for calls to the United States in Germany.

Table 14.14: Market share of incumbents and leading operators in telecommunication markets
(% of total market)

	Fixed telecommunications, 2005			Market share of the leading operator in mobile telecommunications, 2006 (4)
	Local calls (1)	National long distance calls (2)	International calls (3)	
EU-25	72	66	56	39
Belgium	68	68	58	45
Bulgaria	:	:	:	:
Czech Republic	76	63	65	41
Denmark	:	:	:	32
Germany	56	57	39	37
Estonia	:	:	:	46
Ireland	83	63	62	47
Greece	78	73	74	41
Spain	78	75	62	46
France	80	68	67	46
Italy	71	73	47	41
Cyprus	100	100	86	90
Latvia	97	98	72	35
Lithuania	97	88	76	36
Luxembourg	:	:	:	51
Hungary	92	90	87	45
Malta	99	99	98	52
Netherlands	75	75	45	48
Austria	53	59	50	39
Poland	85	70	71	34
Portugal	:	78	80	46
Romania	:	:	:	:
Slovenia	100	100	83	71
Slovakia	99	100	88	56
Finland	95	45	41	45
Sweden	:	:	:	43
United Kingdom	60	52	53	26
Norway	:	73	61	57

(1) Austria and Finland, 2004; Cyprus, 2003.

(2) Finland, 2004; Cyprus, 2003.

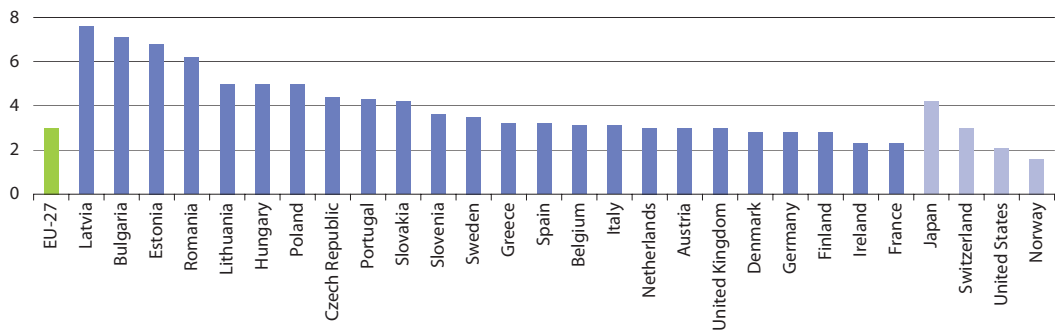
(3) Finland, 2004.

(4) Norway, 2005.

Source: Eurostat (tsier070 and tsier080), National Regulatory Authorities

Figure 14.14: Telecommunications expenditure, 2006 (1)

(% of GDP)

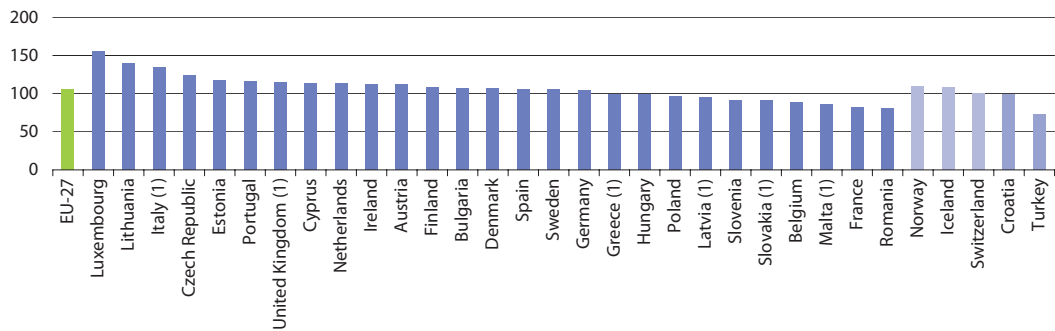


(1) Cyprus, Luxembourg and Malta, not available.

Source: Eurostat (tsiir090), European Information Technology Observatory (EITO)

Figure 14.15: Mobile phone subscriptions, 2006

(average number of subscriptions per 100 inhabitants)



(1) Source: International Telecommunication Union (ITU).

Source: Eurostat (tin00060)

Table 14.15: Price of fixed telecommunications

(EUR per 10-minute call)

	Local calls			National long distance calls			Calls to the United States		
	2004	2005	2006	2004	2005	2006	2004	2005	2006
EU-25	0.37	0.35	0.36	0.92	0.76	0.74	2.13	2.11	1.79
Belgium	0.57	0.57	0.57	0.57	0.57	0.57	1.98	1.98	1.98
Bulgaria	:	:	:	:	:	:	:	:	:
Czech Republic	0.56	0.56	0.56	1.46	1.13	0.56	3.64	2.02	2.02
Denmark	0.37	0.37	0.37	0.37	0.37	0.37	2.38	2.38	2.38
Germany	0.42	0.39	0.39	1.20	0.49	0.49	1.23	1.23	0.46
Estonia	0.23	0.23	0.23	0.23	0.23	0.23	2.26	2.10	2.13
Ireland	0.49	0.49	0.49	0.82	0.82	0.82	1.91	1.91	1.91
Greece	0.31	0.31	0.31	0.73	0.74	0.74	2.91	2.93	3.49
Spain	0.28	0.28	0.19	0.88	0.84	0.85	1.53	1.53	1.53
France	0.39	0.33	0.36	0.96	0.83	0.89	2.24	2.27	2.32
Italy	0.25	0.22	0.22	1.15	1.15	1.15	2.12	2.12	2.12
Cyprus	0.20	0.22	0.22	0.20	0.22	0.22	0.80	0.66	0.66
Latvia	0.36	0.36	0.36	1.03	1.03	1.03	5.94	5.94	5.94
Lithuania	0.39	0.39	0.39	0.79	0.79	0.79	4.07	4.07	4.07
Luxembourg	0.31	0.31	0.31	:	:	:	1.37	1.37	1.37
Hungary	0.41	0.41	0.40	1.09	1.09	1.04	2.43	2.97	2.88
Malta	0.25	0.25	0.25	:	:	:	1.65	1.77	1.64
Netherlands	0.33	0.33	0.33	0.49	0.49	0.49	0.85	0.85	0.85
Austria	0.49	0.49	0.49	0.59	0.59	0.59	1.90	1.90	1.90
Poland	0.35	0.30	0.50	1.22	1.22	1.00	3.67	3.74	1.23
Portugal	0.40	0.37	0.37	0.65	0.65	0.65	3.06	3.11	3.11
Romania	:	:	:	:	:	:	:	:	:
Slovenia	0.26	0.26	0.26	0.26	0.26	0.26	1.75	1.40	1.40
Slovakia	0.60	0.60	0.60	1.29	1.23	1.29	3.02	3.02	1.23
Finland	0.24	0.24	0.24	0.90	0.94	0.94	4.77	4.90	4.90
Sweden	0.29	0.29	0.29	0.29	0.29	0.29	1.06	1.06	1.18
United Kingdom	0.44	0.44	0.44	0.44	0.44	0.44	2.08	2.08	2.23
Norway	0.32	0.34	:	0.32	0.34	:	0.82	0.77	:
Japan	0.25	0.25	0.25	1.02	1.02	1.02	4.39	4.39	4.34
United States	0.07	0.07	0.07	1.03	1.03	1.03	-	-	-

Source: Eurostat (tsier030), Teligen