

Research and development

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Research and development activities are classified within NACE according to the field of investigation of the research. A distinction is made between research and experimental development within natural sciences and engineering (NACE Group 73.1) and research and experimental development within social sciences and humanities (NACE Group 73.2). Note that market research activities are not covered and that these are included as part of Subchapter 26.2. Furthermore, it should be noted that the statistics presented for the research and development sector in this subchapter concern exclusively those enterprises whose main activity consists of carrying out research and development activities, and thus excludes research and development departments of universities, public administrations and enterprises whose main activity is otherwise classified.

Research funding in the EU is organised around multi-yearly programmes. The seventh framework programme for research and technological development for the period 2007 to 2013 (FP7) has funding amounting to around EUR 51 billion. FP7 will be implemented through specific programmes corresponding to the main themes of European research policy.

In April 2007, the European Commission adopted a Green paper titled 'The European Research Area: New Perspectives'⁽¹⁾. This opens discussions on a number of issues, notably the mobility of researchers, developing research infrastructure and institutions; as well as improvements in the

circulation and sharing of knowledge, research programmes, and global research cooperation. It aims to tackle underinvestment and fragmentation. The principles of the overall governance of the European Research Area (ERA) are known as the 'Ljubljana Process' stemming from discussions in Ljubljana and Brdo (Slovenia) in April 2008. Five initiatives for the ERA have been foreseen, with several already adopted in 2008; these concern researchers, research infrastructure, knowledge sharing, joint programming, and international science and technology cooperation.

Increased levels of research and development expenditure are seen as one of the means to achieve the goals set out by the European Council in Lisbon in 2000: in 2002 a target was set that research and development intensity (research and development expenditure relative to GDP) should reach 3 % by 2010.

In 2007, research and development expenditure in the EU-27 amounted to more than EUR 226 billion, compared with EUR 215 billion in 2006 and EUR 170 billion in 2000. Together, Germany (EUR 61 billion), France (EUR 39 billion) and the United Kingdom (EUR 34 billion, 2006) accounted for 60 % of total research and development expenditure in the EU-27. The EU-27's research and development intensity in 2007 was 1.83 %, practically unchanged compared with the ratios of 1.84 % recorded in 2006 and 1.85 % in 2000. In 2007 research and development intensity varied among the Member States from 0.45 % of GDP in Cyprus to 3.64 % in Sweden. Finland (3.47 %) was

(1) COM(2007) 161; for more information: http://ec.europa.eu/research/era/index_en.html.

Table 24.1: Research and development (NACE Division 73)
Structural profile: ranking of top five Member States, 2006

	Highest value added (1)			Largest number of persons employed (2)			Most specialised: share in the non-financial business economy (%)	
	Country	(EUR million)	(% of EU-27)	Country	(thousand)	(% of EU-27)	Value added (3)	Persons employed (4)
1	United Kingdom	6 279	31.1	United Kingdom	103.1	25.8	United Kingdom (0.6)	Netherlands (0.7)
2	Germany	5 055	24.5	Germany	93.9	23.5	Slovenia (0.5)	United Kingdom (0.6)
3	France	2 912	12.3	France	41.9	10.5	Romania (0.5)	Romania (0.6)
4	Netherlands	1 684	7.4	Netherlands	33.8	8.4	Germany (0.4)	Slovakia (0.5)
5	Italy	1 042	4.9	Italy	26.5	6.6	France (0.4)	Germany (0.4)

(1) Luxembourg, Malta and Sweden, not available; Cyprus and Poland, 2005; share of EU-27, 2005.

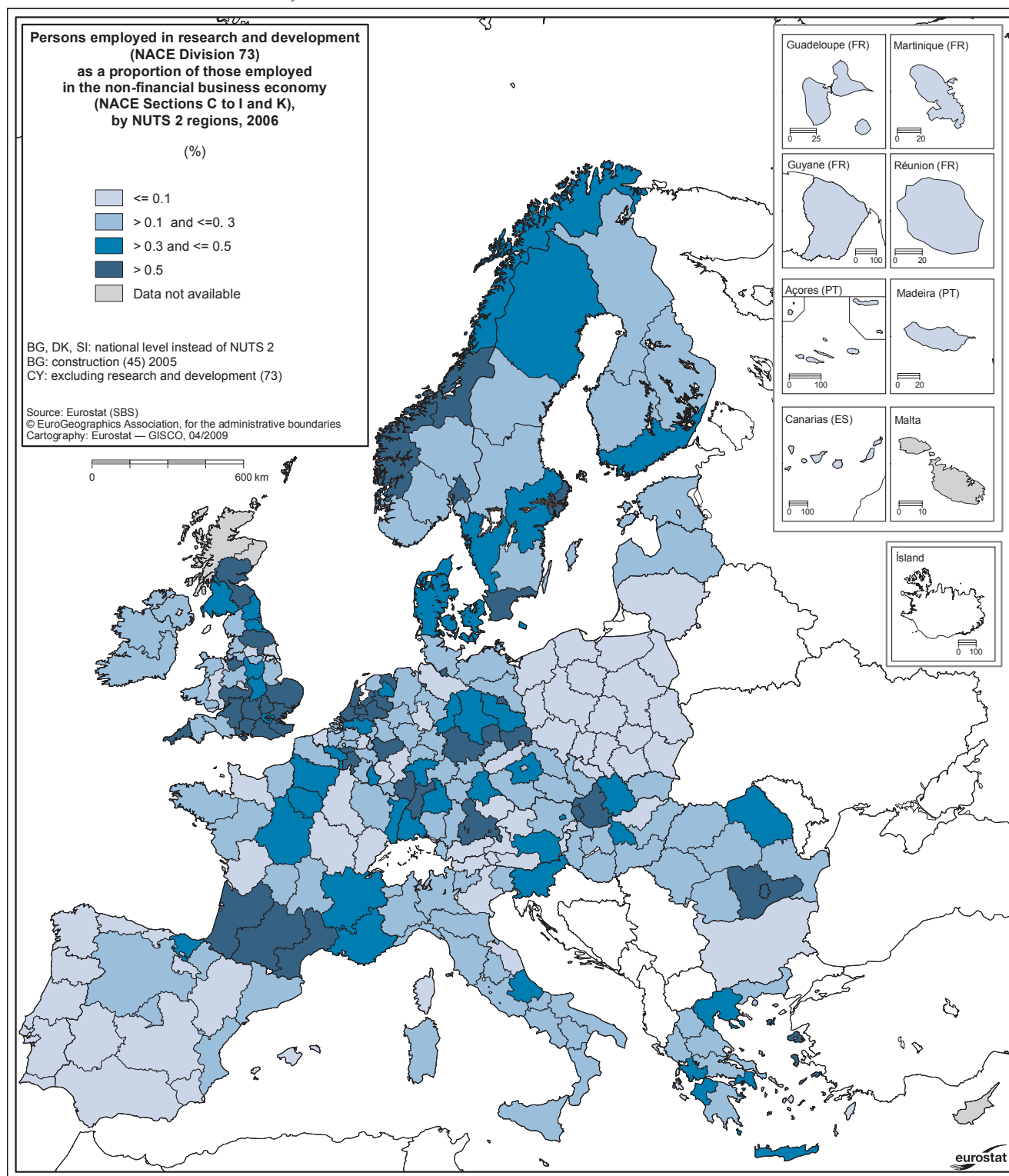
(2) Luxembourg, Malta and Sweden, not available; Cyprus and Poland, 2005.

(3) Luxembourg, Malta, the Netherlands and Sweden, not available; Bulgaria, Cyprus, Poland and Romania, 2005.

(4) Luxembourg, Malta and Sweden, not available; Bulgaria, Cyprus, the Netherlands, Poland and Romania, 2005.

Source: Eurostat (SBS)

Map 24.1: Research and development (NACE Division 73)
 Persons employed in research and development (NACE Division 73) as a proportion of those employed in the non-financial business economy (NACE Sections C to I and K)



Source: Eurostat (SBS)

the only other Member State to record research and development intensity over 3 %, with Austria (2.56 %), Denmark (2.55 %) and Germany (2.53 %) the next closest to this threshold. The highest relative increases in research and development intensity between 2000 and 2007 were in Cyprus (from 0.24 % to 0.45 %) and Estonia (from 0.61 % to 1.14 %).

Structural profile

Approximately 400.0 thousand persons worked in the 40.7 thousand enterprises in the EU-27's research and development sector (NACE Division 73) in 2006, accounting for just 0.3 % of the non-financial business economy (NACE Sections C to I and K) workforce. Paid employees accounted for a high proportion (93.0 % in 2005) of the persons employed in this sector in the EU-27. Value added reached EUR 400 billion in 2005, around 0.4 % of the non-financial business economy total. In terms of employment and value added the research and development sector was the smallest of the sectors covered by the chapter aggregates used in this publication.

The United Kingdom and Germany dominated this sector, combining to generate more than half (55.6 %) of the value added in the EU-27 and to provide close to half (49.3 %) of the employment. France was the only other Member State with a double digit share of the EU-27's value added or employment in this sector. Only in a few Member States⁽²⁾ did this sector's contribution to non-financial business economy value added approach or exceed 0.5 % in 2006, notably in the United Kingdom (0.6 %), Slovenia and Romania (both 0.5 %). The relatively high specialisation of the Netherlands in this sector can be seen from a

similar analysis based on employment, as 0.7 % of Dutch employment in the non-financial business economy was in the research and development sector in 2005. Continuing this analysis of the relative importance of the research and development sector in terms of its contribution to non-financial business economy employment (see map), there are many regions where this sector's contribution was close to zero. Only in Voreio Aigaio (Greece) did this sector's share of non-financial business economy employment exceed 2 %, and in fact there it reached 4.8 %. Most of the regions where this sector contributed more than 0.5 % of the non-financial business economy employment were in the United Kingdom, Germany or the Netherlands.

Large enterprises dominated the EU-27's research and development sector, accounting for close to three fifths (58.3 %) of the value added in 2006, compared with their contribution of just over two fifths (42.1 %) for the non-financial business economy as a whole. In relative terms the contribution of medium-sized enterprises was even greater, as they generated close to one quarter (24.5 %) of the research and development sector's value added in 2006, compared with an average of 17.8 % for the non-financial business economy (in 2005).

Employment characteristics

The research and development sector's workforce in the EU-27 was atypical of a services sector, at least in terms of the share of full-time workers: in 2007, some 86.6 % of the sector's workforce was employed full-time, slightly above the non-financial business economy average, and 6.9 percentage points above the non-financial services

(²) Bulgaria, Cyprus, Poland and Romania, 2005; Luxembourg, Malta, the Netherlands and Sweden, not available.

Table 24.2: Research and development (NACE Division 73)
Share of value added and persons employed by enterprise size class, EU-27, 2006 (%)

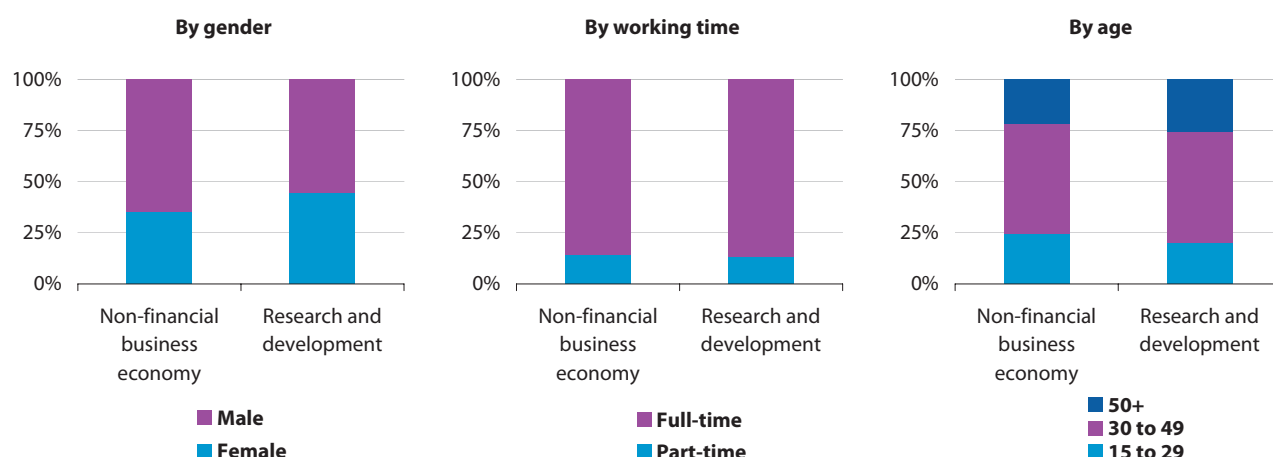
	Value added		Persons employed	
	Non-financial business economy (1)	Research and development	Non-financial business economy	Research and development (2)
1 to 9 persons employed	21.0	7.0	29.7	11.8
10 to 49 persons employed	18.9	10.2	20.7	15.8
50 to 249 persons employed	17.8	24.5	17.0	25.3
250 or more persons employed	42.1	58.3	32.6	45.8

(1) 1 to 9 persons employed and 50 to 249 persons employed, 2005.

(2) 1 to 9 persons employed and 10 to 49 persons employed, 2005.

Source: Eurostat (SBS)

Figure 24.1: Research and development (NACE Division 73)
Employment characteristics, 2007



Source: Eurostat (LFS)

(NACE Sections G to I and K) average of 79.7 %. An analysis of the workforce in terms of gender shows that in this respect the research and development sector is typical of a services activity, with male employment accounting for 55.4 % of the sectoral total, very close to the non-financial services average and 9.5 percentage points below the non-financial business economy average. In several Member States the proportion of men and women in research and development sector's workforce was almost the same: the share of men was at its lowest ⁽³⁾ in Bulgaria, just 38.2 %.

In terms of age profile, there was a much higher proportion of the research and development sector's workforce that were aged 50 or over (25.6 %) than the average for the non-financial business economy (21.9 %), and also a slightly higher proportion of persons aged 30 to 49. Consequently only a relatively small proportion of the research and development sector's workforce was made up of younger workers aged less than 30.

Expenditure, productivity and profitability

The EU-27's research and development sector recorded gross tangible investment valued at approximately EUR 3.7 billion in 2005, around 0.4 % of the total in the non-financial business economy. In 2006, the two largest Member States in this sector, namely the United Kingdom and Germany, recorded the highest levels of

investment, EUR 1.4 billion in the United Kingdom and EUR 0.9 billion in Germany, combining to account for close to three fifths of the total EU-27 investment in this sector.

Personnel costs accounted for a high proportion (40.0 %) of operating expenditure in the EU-27's research and development sector in 2006. This was approximately two and a half times the average proportion within the non-financial business economy, and the second highest proportion (lower only than for the extraction of oil and gas) among the non-financial business economy NACE divisions. This can to some extent be explained by high average personnel costs, which were EUR 50.0 thousand per employee, compared with a non-financial business economy average of EUR 28.8 thousand per employee: the high average personnel costs reflect the relatively highly qualified nature of the workforce.

In 2005, the apparent labour productivity of the EU-27's research and development sector was EUR 55.0 thousand per person employed, which when compared with the high average personnel costs resulted in a wage adjusted labour productivity ratio of 110.0 %. This was the lowest wage adjusted labour productivity ratio among the non-financial business economy NACE divisions in 2005 or 2006. Due to negative value added in this sector in 2006, Ireland recorded a negative wage adjusted labour productivity ratio, while a further seven Member States ⁽⁴⁾ recorded ratios

⁽³⁾ Lithuania, 2006; Estonia, Ireland, Cyprus, Malta and Portugal, not available.

⁽⁴⁾ Poland, 2005; Cyprus, Luxembourg, Malta and Sweden, not available.

below parity (100 %) indicating that average personnel costs outstripped apparent labour productivity, with the lowest ratio (55.2 %) in Denmark. None of the Member States recorded a wage adjusted labour productivity ratio in the research and development sector that was higher than the average ratio for their respective non-financial business economies. Equally, this sector recorded a low gross operating rate, as the gross operating

surplus (value added less personnel costs) represented 8.0 % of turnover in 2005, 2 percentage points below the EU-27 non-financial business economy average. Along with Ireland, several other Member States recorded negative gross operating rates (indicating that value added was less than personnel costs) for the research and development sector, notably Denmark, Finland and the United Kingdom.

Table 24.3: Research and development (NACE Division 73)
Main indicators, 2006 (1)

	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT
Enterprises	0.4	0.0	0.5	0.3	4.6	0.1	0.2	2.7	1.5	3.1	11.4	0.0	0.1	0.1
Persons employed	6.2	0.3	6.1	6.4	93.9	0.4	2.4	8.9	16.7	41.9	26.5	0.0	1.2	0.7
Turnover	987	5	188	797	7 530	14	288	608	1 231	7 567	2 174	0	23	21
Production	997	6	190	885	7 426	14	201	721	1 004	7 140	2 412	0	24	19
Purch. of goods & serv.	505	4	113	654	4 204	9	577	529	713	5 610	1 283	0	14	12
Value added	559	2	122	236	5 055	5	-272	189	825	2 912	1 042	0	11	9
Personnel costs	465	1	87	426	4 218	5	95	140	619	2 605	718	0	7	6
Average personnel costs	79.6	4.7	15.3	67.0	47.0	11.4	42.2	21.5	38.7	62.3	50.1	:	5.7	7.8
Gross operating surplus	95	0	36	-190	837	0	-366	48	205	308	324	0	4	3
Gross investment	43	0	30	57	928	1	15	30	103	585	120	0	4	1
Apparent labour prod.	90.8	5.4	20.0	37.0	53.8	11.5	-111.6	21.1	49.4	69.6	39.3	:	8.9	12.0
Wage adj. labour prod.	114.1	114.6	130.4	55.2	114.5	101.0	-264.7	98.5	127.5	111.7	78.5	:	157.5	153.7
Gross operating rate	9.6	7.4	18.9	-23.9	11.1	1.2	-127.4	7.9	16.7	4.1	14.9	:	17.2	16.1
Investment rate	7.6	22.2	24.2	24.2	18.4	12.7	-5.6	16.1	12.5	20.1	11.5	:	33.6	8.3
	LU	HU	MT	NL	AT	PL	PT	RO	SI	SK	FI	SE	UK	NO
Enterprises	0.0	3.0	:	2.4	0.5	0.9	1.0	0.6	0.6	0.1	0.4	2.9	3.1	0.5
Persons employed	:	6.4	:	33.8	5.3	3.8	1.3	23.1	2.6	4.5	3.2	:	103.1	7.5
Turnover	:	279	:	3 092	333	224	23	346	163	143	357	:	16 439	741
Production	:	215	:	3 052	353	217	22	365	152	150	325	:	18 593	732
Purch. of goods & serv.	:	185	:	1 601	265	117	14	213	85	90	230	:	10 087	485
Value added	:	96	:	1 684	274	95	11	167	78	62	148	:	6 279	527
Personnel costs	:	76	:	1 400	262	49	6	139	65	46	174	:	6 532	505
Average personnel costs	:	17.0	:	42.6	52.1	16.8	6.9	6.1	27.5	10.4	55.5	:	64.3	67.6
Gross operating surplus	:	20	:	284	12	46	5	27	13	17	-25	:	-252	22
Gross investment	:	11	:	142	50	8	2	71	9	11	13	:	1 396	40
Apparent labour prod.	:	15.0	:	49.8	51.3	24.7	8.2	7.2	29.9	14.0	46.1	:	60.9	70.1
Wage adj. labour prod.	:	88.3	:	116.9	98.5	147.6	119.8	118.9	108.9	134.8	83.1	:	94.7	103.6
Gross operating rate	:	7.2	:	9.2	3.6	20.7	19.9	7.9	7.7	11.6	-7.1	:	-1.5	3.0
Investment rate	:	11.2	:	8.4	18.3	8.6	18.6	42.3	11.1	18.1	8.7	:	22.2	7.6

(1) Cyprus and Poland, 2005; unless otherwise stated, values refer to EUR million; number of enterprises and number of persons employed are given in thousands; average personnel costs and apparent labour productivity are given in EUR thousand per person; wage adjusted labour productivity, gross operating rate and investment are ratios expressed as percentages.

Source: Eurostat (SBS)