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An abstract graphic on the left side of the page consists of several overlapping, semi-transparent geometric shapes. There is a large blue sphere-like shape, a green pyramid-like shape, and various rectangular and triangular shapes in shades of blue, grey, and purple. The shapes are layered, creating a sense of depth and movement.

Research & Development Expenditure and Personnel in Greece in 2011

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National Documentation Centre / National Hellenic Research Foundation
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This publication of the **National Documentation Centre (EKT)** presents the Research and Technological Development indicators in Greece for the year 2011. Apart from its use as a reference text for those directly involved in Research, Technological Development and Innovation (RTDI), it also demonstrates the increasing importance that **evidence-based policy** is acquiring in our country.



'Evidence-based policy' builds upon objective data that are derived from systematic monitoring and assessment of strategic and operational targets with the use of appropriate indicators.

The key elements in the production of relevant indicators which, in turn, help to develop effective policy for RTDI are:

- *Sound Methodology* that is based on internationally established methods and standards for data collection.
- *Valid data* that is ensured when a high level of comprehension is achieved by those who provide the data
- *Qualified and experienced staff*, with statistical processing and analysis skills. This requirement has led many governmental authorities to outsource these tasks.
- *Transparency* that encompasses user friendly data accessibility by all, transparent data collection and data processing methods.
- *Independence* that is ensured when the organization that produces the indicators is separate (or different) from the organization responsible for policy design and implementation.

Considering the above elements, the General Secretariat for Research and Technology used the extensive experience and expertise of the National Documentation Centre (EKT) in this field, and assigned to EKT the responsibility for data collection and production of R&D and Innovation indicators. Emphasis was placed on the use of sound methodology and the production of reliable statistics in line with international standards.

A reform of the whole production process of RTDI statistics has been introduced. A new platform has been created for online data collection as well as an online help desk, which assists respondents when completing the questionnaire. Finally, results are disseminated to all stakeholders, as well as to the general public.

Overall, findings so far are encouraging as Gross Domestic Expenditure for Research and Development (GERD) reached 0.67% of GDP (EUR 1 391 million) in 2011 compared to 0.58% (EUR 1 311 million) in 2007. More specifically, R&D Expenditure in the Business Sector increased from 0.16% in 2007 to 0.23% in 2011. This increase, during a period of financial crisis for Greek enterprises, is an optimistic sign of the significance that Research and Innovation gain as factors to boosting competitiveness of enterprises.

This publication is the outcome of a systematic work undertaken by members of EKT staff who have given their best and have managed to bring this task to fruition. In doing so, they managed to stick to a very tight schedule and successfully overcome all difficulties which arose during data collection, processing and compilation, also working closely and constructively with GSRT, EL.STAT. and EUROSTAT; they all deserve congratulations!

In conclusion, it is obvious that this effort will only lead to a substantial outcome as long as we all, who design and implement the Research, Technological Development and Innovation policy, systematically use these data in a way that the policy we formulate be evidence-based, addressing real needs and meeting key challenges.

General Secretary
For Research and Development



Dr Christos Vasilakos

Preface

This publication is a brief presentation of selected indicators compiled from the official statistics on Research & Development (R&D) in Greece for 2011. The R&D survey was conducted by the National Documentation Centre (EKT), the competence authority for the production of R&D and Innovation Statistics since 2012 (Official Journal of Government 1359/B/25.04.2012).

R&D statistics provide valuable information on the expenditure spent and personnel engaged in R&D activities in a country, as a whole and for different breakdowns by sector of performance, region, occupation, sex, etc. They comprise part of the official statistics produced on a mandatory basis by all EU Member States and Eurostat, in line with Commission Regulations.

Considering that the economic development and prosperity of a country are linked to the financial resources devoted to the implementation and support of R&D activities, R&D statistics form the basis for the development and monitoring of policies at the European and national levels. In particular, progress made towards the EU2020 headline target of investing 3% of the EU GDP on R&D is monitored by the 'R&D intensity' indicator (R&D expenditure as a percentage of GDP).

The current publication first sets out the main indicators that place Greece in the international context and enable the comparison of the Greek R&D system to the other European ones. In parallel, focus is placed on indicators that contribute to the understanding of the various components, linkages and dynamics of the R&D activities in all sectors of the economy. Statistics cover all R&D activities in the academic, research and business sectors, the sources of funding, the staff working on R&D with various breakdowns, the regional distribution of the R&D activities.

Statistical data are provided with no interpretation. The ultimate goal is to provide data that will serve as a basis for policy development by the com-

petent authorities as well as for further analysis by the wider stakeholders' community in research and businesses.

In specific, this publication presents the R&D expenditure and personnel indicators for the entire country (Chapter 1), a more detailed analysis of R&D expenditure (chapter 2) and R&D Personnel (chapter 3), as well as the regional distribution of the above (chapter 4). It then features the most important statistical variables for each one of the four sectors of R&D performance: Business Enterprise Sector (chapter 5), Government Sector (chapter 6), Higher Education Sector (chapter 7) and Private non-profit Sector (chapter 8). Finally, methodological notes of the R&D statistical surveys are provided in chapter 9.

For the production of R&D data which are used for the calculation of R&D indicators, EKT developed exhaustive lists of Greek R&D performers, collected data from them, performed extensive consistency checks against official databases of the Greek state, such as the Monitoring Information System (M.I.S.), and finally carried out data processing and computation of the indicators. The main methodological issues have been discussed and finalized in collaboration with the General Secretariat for Research and Technology and the Hellenic Statistical Authority.

Part of the aforementioned activities is financed through the project "National Information System for Research and Technology/Social Networks-User Generated Content" (MIS number 296115; beneficiary: National Documentation Centre-www.epset.gr). This project is carried out under the Operational Programme "Digital Convergence" (NSRF) co-funded by Greece and the European Union-European Regional Development Fund.

Dr Evi Sachini



Director EKT

Contributors

The production of R&D statistics, part of which is presented in this publication, was carried out after many years had passed without Greece surveying R&D. For the successful completion of the 2011 R&D survey, within extremely tight deadlines, EKT allocated the necessary in-house resources (manpower and infrastructure) and moreover collaborated closely and systematically on specific methodological issues with the General Secretariat for Research and Technology and the Hellenic Statistical Authority.

With the participation of the General Secretariat for Research and Technology, the GSRT being the authority that assigned the responsibility of the R&D survey to the National Documentation Centre, previous experience on the field has been taken into consideration to ensure continuity in the methodological approach. To that end, members of GRST staff contributed valuable expertise to the elaboration of the project: Ms Evangelia Sofouli, Head of Planning and Programming Directorate, Dr Asterios Chatziparadeisis, Officer at the General Secretary for Research and Technology, and Ms Margarita Theodoropoulou, Head of Research and Technology Indicators Unit.

The Hellenic Statistical Authority (EL.STAT.), the competence authority for the production of official statistics in Greece, contributed with their specialized expertise and know-how in statistical surveys, in the procedures and systems that are in place in the Hellenic Statistical System. In particular, with the support of the President of EL.STAT., Mr Andreas Georgiou, the following EL.STAT. staff members were involved: Dr Ioannis Moschakis, Head of Organization, Methodology & International Relations Division, Ms Georgia Golemi, Head of Manufacture, Research and Technology Statistics Section, Mr Ioannis Nikolaidis, Head of Methodology, Analysis and Research Section.

Important has been the contribution of the General Secretariat for Public Investments, with the support of the Secretary General Mr Giorgos Giannousis, and of the Special Service MIS (Monitoring Information System),

with the support of the Director of the Service Dr Alexandros Synanidis, in providing administrative data on the financing of R&D activities through the NSRF (National Strategic Reference Framework).

Mr Theodoros Karounos, Chairman of the Board of Directors of the Greek Free / Open Source Software Society (GFOSS), contributed to the project with his substantial technical experience in ICT related issues as well as issues related to linking data from various administrative sources of the public sector.

From the National Documentation Centre, Professor Yiannis Caloghirou (NTUA), Chairman of the Scientific Council of the National Documentation Centre, contributed with his internationally recognized scientific expertise in the areas of research and innovation. Dr Evi Sachini, Director of EKT, was responsible for the planning, scientific supervision and management of the project. Overall, EKT staff worked with commitment and strong willingness on demanding tasks. Dr Nena Malliou was responsible for the coordination and supervision of the implementation of the survey and of the calculation of indicators. The development of the statistical methodology and supervision of procedures throughout the production process was the responsibility of Ms Tonia Ieromnimon. Dr Dimitris Karaiskos, Mr Andreas Kalaitzis, Mr Nikos Mastoris, Mr Marios Vlachos, Mr Fotis Routsis as well as EKT's Network Operation Centre team, worked on the development of information systems under the supervision of Dr Nikos Houssos and Dr Panagiotis Stathopoulos. Dr Andriana Dimakopoulou, Ms Maria Kleideri, Ms Maria Konstantinou and Ms Irini Toitou (in alphabetic order) worked with perseverance and efficiency on data collection and data processing. Ms Despoina Triantafillidou has provided administrative assistance throughout the project. Ms Dimitra Pelekanou was responsible for the graphic design of the electronic questionnaires.

Finally, the production of R&D statistics would not be possible without the cooperation of numerous people working in all institutes, universities, enterprises, etc. that took part in the survey and provided quantitative information about R&D Expenditure and R&D Personnel.

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CHAPTER 1

Main R&D Indicators

In 2011, Greece spent EUR 1 391.2 million in R&D activities, which is equivalent to 0.67% of the GDP.

The total personnel working in R&D accounted for 70 229 people (in Head Counts –HC). The total number of R&D personnel measured as full-time equivalents (FTE) was 36 913.

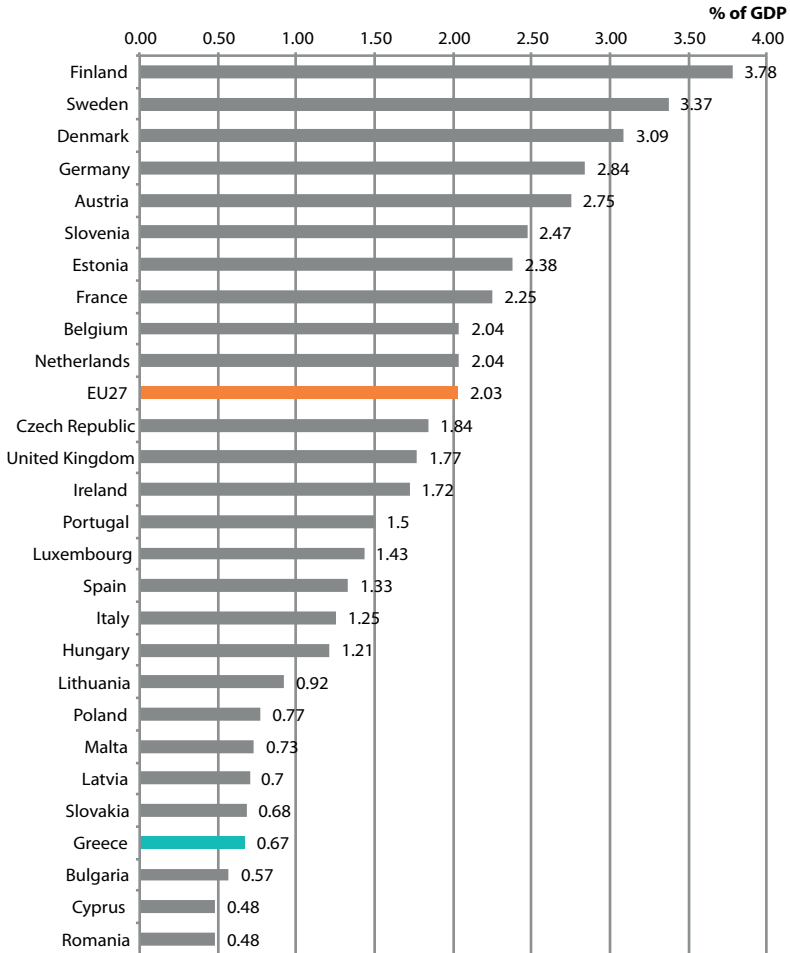
TABLE 1.1: **Main R&D indicators in Greece, 2011**

R&D Intensity (% GDP)	0.67
Intramural R&D Expenditure (million EUR)	1 391.2
R&D Personnel (Head counts)	70 229
R&D Personnel (Full-time equivalents)	36 913
Researchers (Head counts)	45 239
Researchers (Full-time equivalents)	24 674

R&D Intensity (% of GDP)

In 2011, R&D intensity (R&D expenditure as a percentage of GDP), which is the key indicator used to measure progress towards the European Union strategic target for investment in R&D, reached 0.67%. Greece is ranked 24th among the EU27 Member States.

FIGURE 1.1. R&D Intensity (R&D Expenditure as % of GDP) in Greece and in other EU27 Member States, 2011



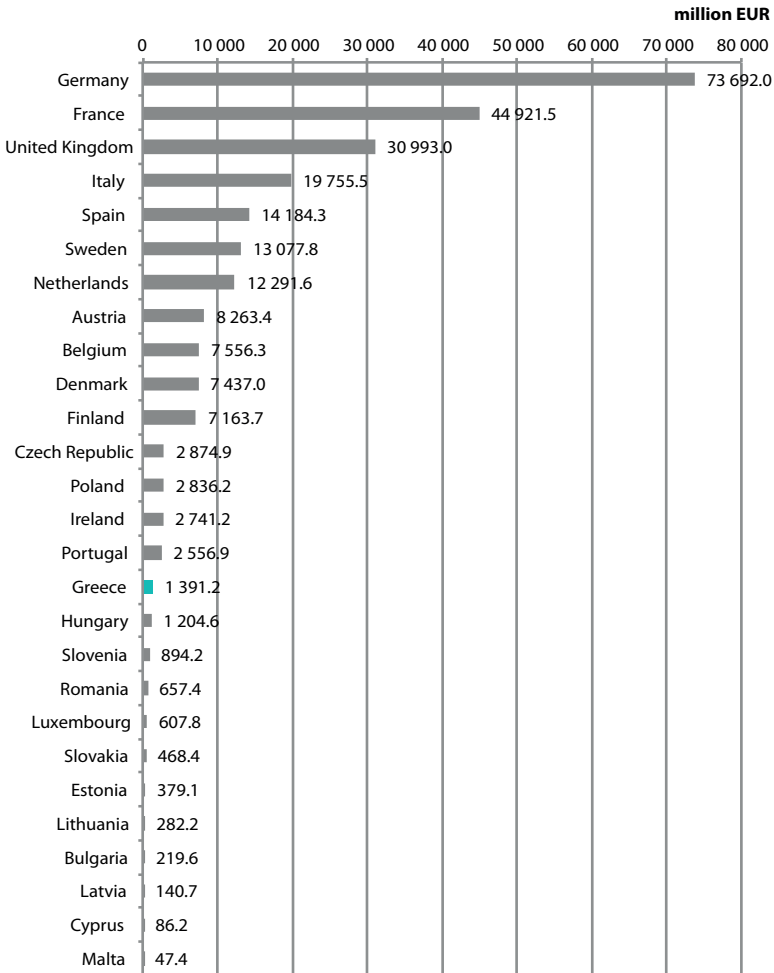
Data were extracted from Eurostat's reference database:

http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/database

R&D Expenditure (million EUR)

A total amount of EUR 1 391.2 million was invested in R&D activities in 2011, which places Greece in the 16th position among the EU27 Member States.

FIGURE 1.2. R&D Expenditure (in million EUR) in Greece and in other EU27 Member States, 2011



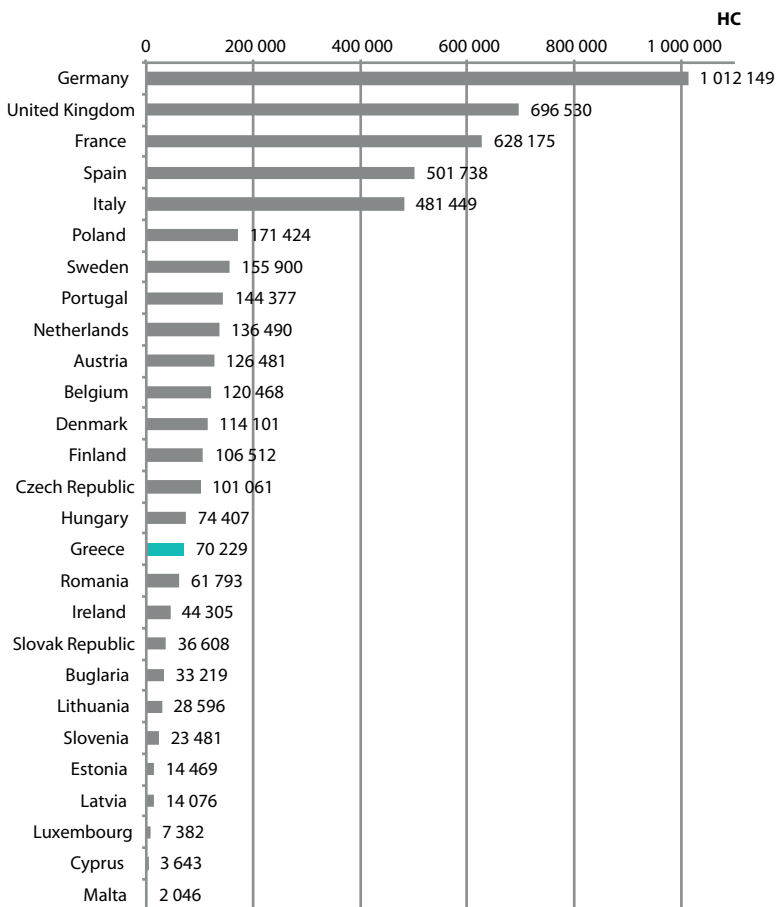
Data were extracted from Eurostat's reference database:

http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/database

R&D Personnel (Head counts)

The total number of people working in R&D activities in Greece in 2011 was 70 229 in head counts. Based on this variable, Greece is ranked 16th among the EU27 Member States.

FIGURE 1.3. R&D Personnel (in Head counts) in Greece (2011) και in other EU27 Member States (2009)¹



Data were extracted from Eurostat's reference database:

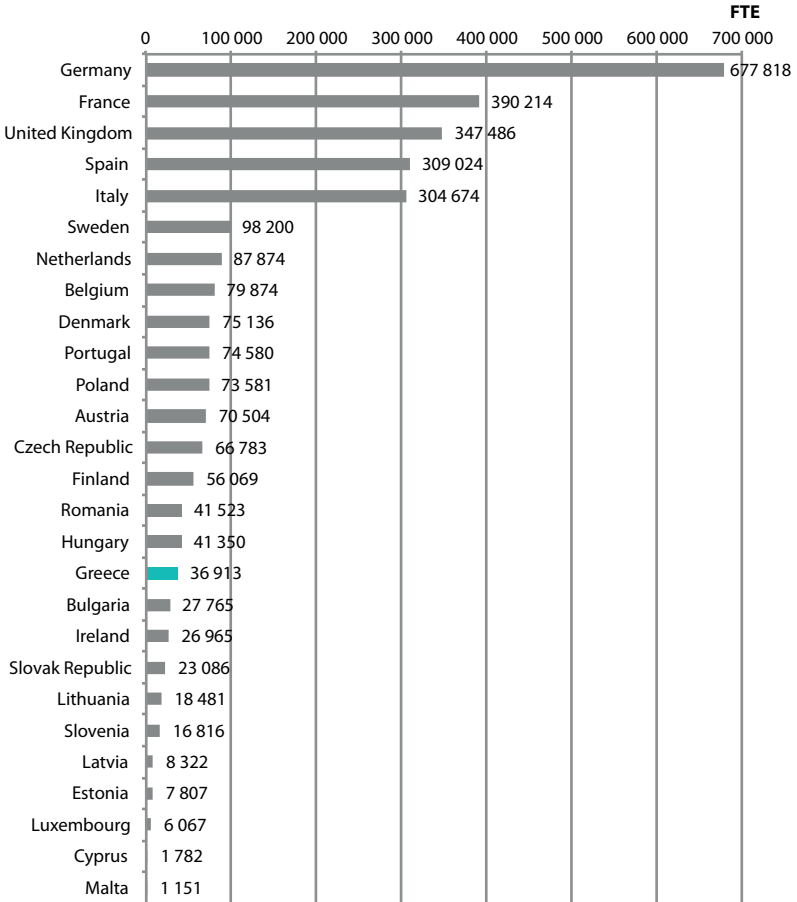
http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/database

1. At the time of data extraction from Eurostat database, data were not complete for all Member States for years 2010 and 2011. Therefore the figure presents data from the latest year available (2009) for all countries, except Greece.

R&D Personnel (Full-time equivalents)

The total R&D personnel, in terms of full-time equivalents, in Greece in 2011 was 36 913, according to which Greece is ranked 16th among the EU27 Member States.

FIGURE 1.4. R&D Personnel (in Full-time equivalents) in Greece and in other EU27 Member States, 2011



Data were extracted from Eurostat's reference database:

http://epp.eurostat.ec.europa.eu/portal/page/portal/science_technology_innovation/data/database



CHAPTER 2

R&D Expenditure

In 2011, Intramural R&D Expenditure in Greece amounted to EUR 1 391.2 million.

The table below presents the analysis of R&D Expenditure (in million EUR) broken down by source of funds and sector of performance.

TABLE 2.1: R&D Expenditure (in million EUR) by sector of performance and source of funds, 2011²

Sector of performance	Total R&D Expenditure	Source of Funds					
		Government		Business Sector (Enterprises)	Other national sources ³	Abroad	
		Total	of which NSRF ⁴			Total	of which EU
BES	485.9	39.1	26.6	382.8	1.0	63.0	40.9
GOV	331.7	255.2	55.4	21.8	0.3	54.4	44.9
HES	559.5	389.2	41.5	50.1	35.0	85.2	77.4
PNP	14.0	1.5	1.3	0.7	9.3	2.6	2.1
Total	1 391.2	685.0	124.8	455.5	45.5	205.2	165.3

-
2. Differences between aggregates and components can be due to rounding.
 3. The 'Other national sources' category comprises the HE and PNP sectors as funding sources. The bulk of the HES component comprises of Universities' own funds.
 4. NSRF: National Strategic Reference Framework (<http://www.espa.gr/en/pages/staticwhatisespa.aspx>)

Sectors of R&D Performance

In 2011, R&D Expenditure in the Higher Education Sector (HES) accounted for 40.2% (EUR 559.5 million) of total domestic expenditure on R&D. This sector was followed by the Business Enterprise Sector (BES) with EUR 485.9 million (or 34.9% of the total), and the Government Sector (GOV) with EUR 331.7 million (or 23.8% of the total). The share of the Private non-Profit Sector (PNP) in the total R&D Expenditure reached 1.0% (EUR 14.0 million).

FIGURE 2.1. R&D Expenditure (in million EUR) by sector of performance, 2011

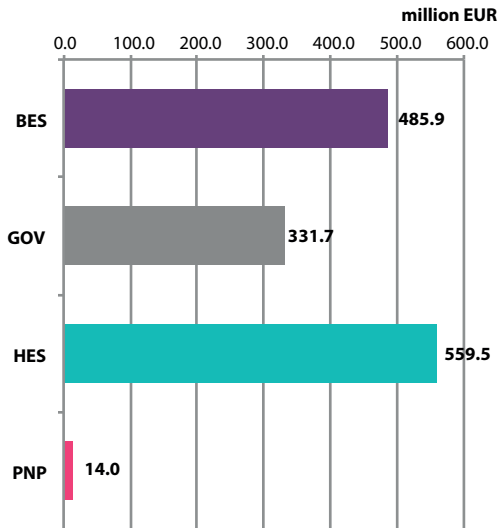
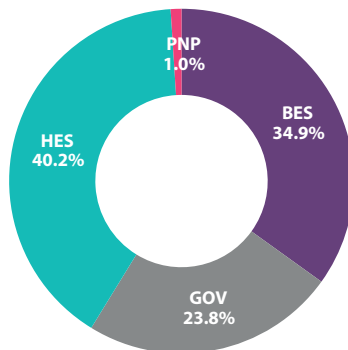


FIGURE 2.2. Percentage (%) distribution of R&D Expenditure by sector of performance, 2011



Source of funds

In 2011, Government financed 49.2% (EUR 685.0 million) of total R&D Expenditure in Greece through the Ordinary Budget, the Public Investment Programme and the National Strategic Reference Framework (NSRF). Funding originating from the business sector (enterprises) accounted for 32.7% (EUR 455.5 million) of total R&D Expenditure. A further 11.9% (EUR 165.3 million) was financed by the European Union in the frame of European research projects.

FIGURE 2.3. R&D Expenditure (in million EUR and as % of total) by source of funds, 2011

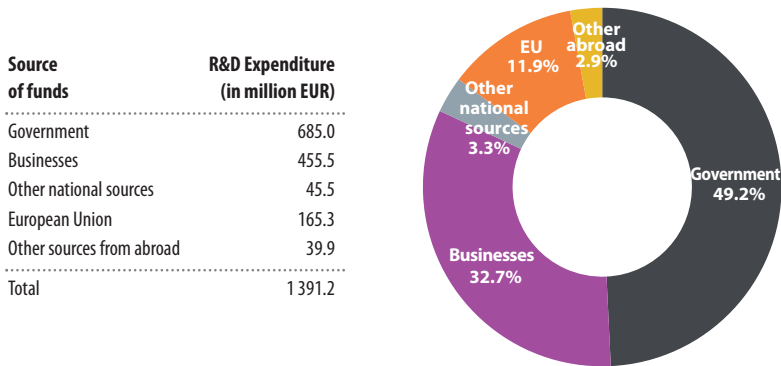
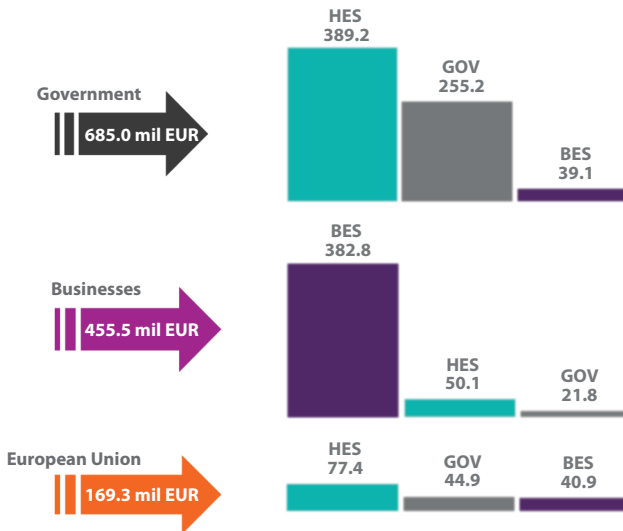


FIGURE 2.4. R&D Expenditure (in million EUR) financed by the three major sources of funds, 2011



Type of costs

Labour costs were the largest component of total R&D expenditure (EUR 891.2 million or 64.1% of total R&D Expenditure) followed by other current costs (i.e. non-capital purchases of materials, supplies and services to support R&D) (EUR 362.6 million or 26.1% of total R&D Expenditure). Capital expenditures (expenditures on instruments and equipment, land and buildings) amounted to EUR 137.4 million and were mainly made by enterprises in BES.

FIGURE 2.5. R&D Expenditure (in million EUR and as % of total) by type of costs, 2011

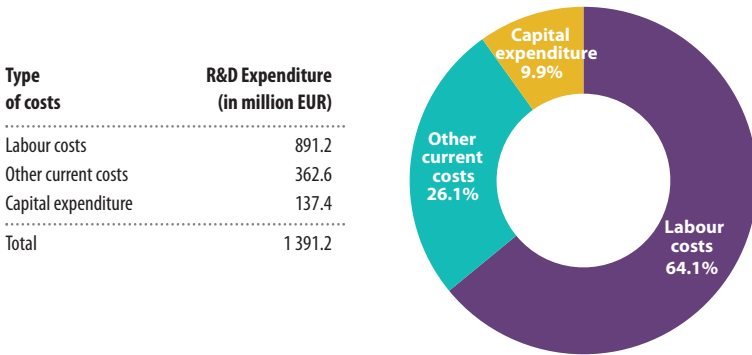
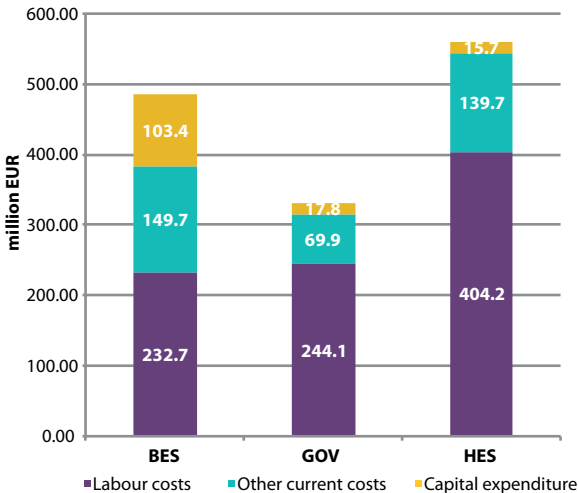


FIGURE 2.6. R&D Expenditure (in million EUR) by type of costs in BES, GOV and HES, 2011



Type of R&D

In 2011, the highest share of R&D expenditure was allocated to applied research (41.0% of total R&D expenditure or EUR 570.5 million), followed almost equally by basic research and experimental development, with 29.7% και 29.3% respectively.

FIGURE 2.7. R&D Expenditure (in million EUR and as % of total) by type of R&D, 2011

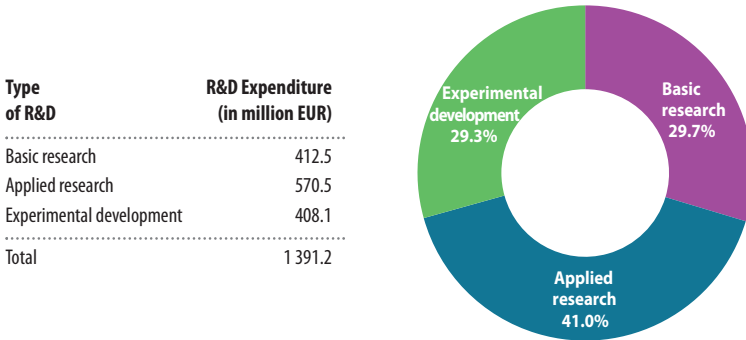
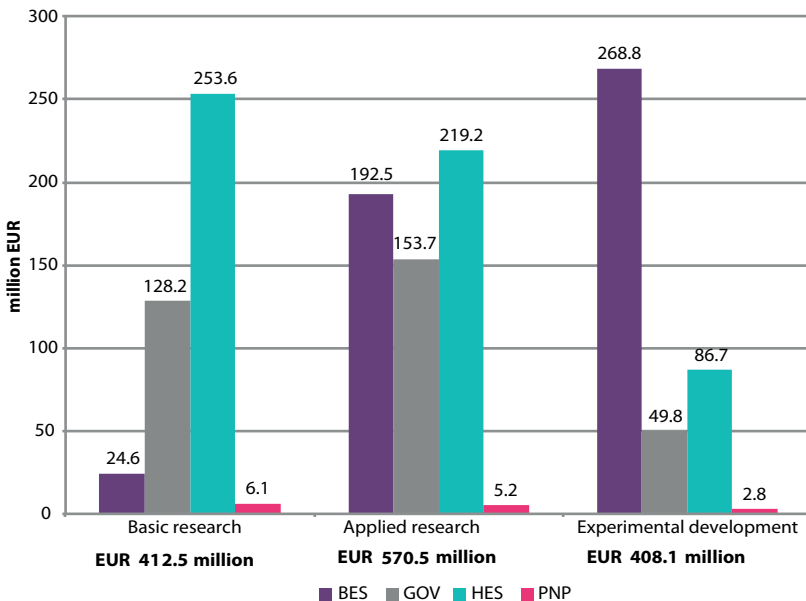


FIGURE 2.8. R&D Expenditure (in million EUR) by type of R&D and sector of performance, 2011



Fields of science

R&D activity was mainly undertaken in the field⁵ “Engineering and technology” (EUR 536.7 million or 38.6% of total R&D Expenditure).

FIGURE 2.2: R&D Expenditure (in million EUR) by major field of science and by sector of performance, 2011

Major field of science	Total R&D Expenditure	Sector of performance			
		BES	GOV	HES	PNP
Natural sciences	197.8	15.0	92.7	88.8	1.2
Engineering and technology	536.7	359.1	55.3	121.9	0.4
Medical sciences	353.3	86.9	63.9	198.2	4.2
Agricultural sciences	45.3	8.4	19.8	17.1	0.1
Social sciences	110.3	15.8	20.0	71.9	2.5
Humanities	147.8	0.7	80.0	61.6	5.5
Total	1 391.2	485.9	331.7	559.5	14.0

5. In R&D statistics, fields of science are described according to the revised Field of Science (FOS) classification in the Frascati Manual:

Natural Sciences: Mathematics, Computer and Information Sciences, Physical sciences, Chemical sciences, Earth and related Environmental sciences, Biological sciences, Other natural sciences

Engineering & Technology: Civil engineering, Electrical engineering, Electronic engineering, Information engineering, Mechanical engineering, Chemical engineering, Materials engineering, Medical engineering, Environmental engineering, Environmental biotechnology, Industrial biotechnology, Nano-technology, Other engineering and technologies

Medical & Health Sciences: Basic medicine, Clinical medicine, Health sciences, Medical biotechnology, Other medical sciences

Agricultural Sciences: Agriculture, Forestry and Fisheries, Animal and Dairy science, Veterinary science, Agricultural biotechnology, Other agricultural sciences

Social Sciences: Psychology, Economics and Business, Educational sciences, Sociology, Law, Political science, Social and economic geography, Media and communication, Other social sciences

Humanities: History and Archaeology, Languages and Literature, Philosophy, Ethics and Religion, Arts (arts, history of arts, performing arts, music), Other humanities

FIGURE 2.9. Percentage (%) distribution of R&D Expenditure by major field of science, 2011

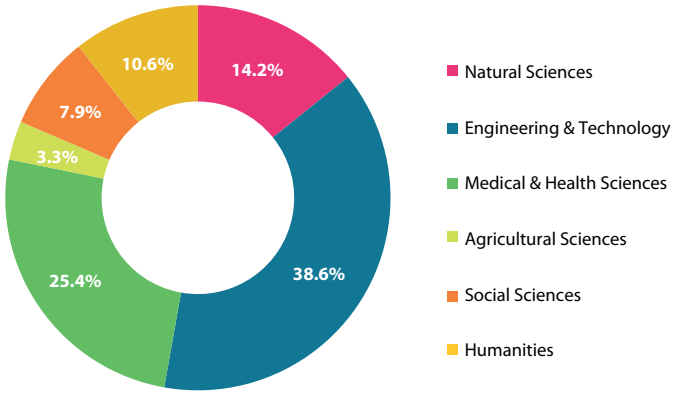
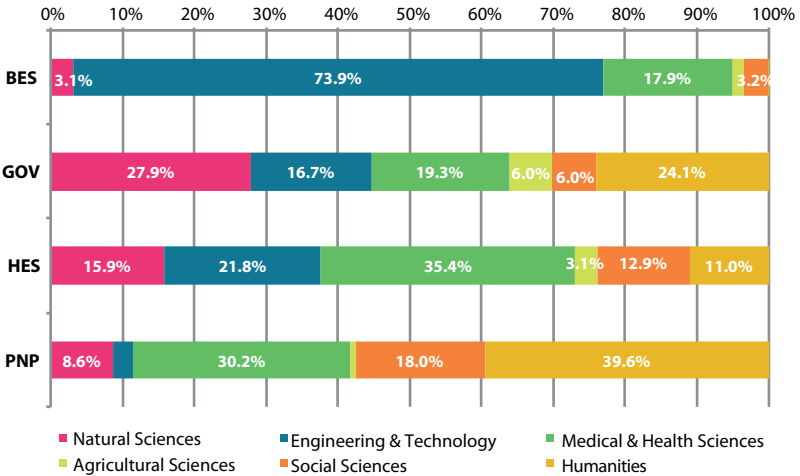


FIGURE 2.10. Percentage (%) distribution of R&D Expenditure by major field of science and by sector of performance, 2011





CHAPTER 3

R&D Personnel

In 2011, the total R&D Personnel in Greece was 70 229 people, comprising researchers, technicians and other supporting staff.

In terms of full-time equivalents (FTE), R&D Personnel counted 36 913 people.

The following table gives an overview of the R&D Personnel by sector of performance and by occupation, both in head counts and in full-time equivalents.

TABLE 3.1: R&D Personnel (in Head Counts and in Full-time equivalents) by sector of performance and by occupation, 2011

Sector of performance	R&D Personnel							
	Head count (HC)				Full-time equivalent (FTE)			
	Total	Researchers	Technicians & equivalent staff	Other supporting staff	Total	Researchers	Technicians & equivalent staff	Other supporting staff
BES	9 984	5 858	2 646	1 480	6 324	4 021	1 500	802
GOV	13 260	6 094	3 048	4 118	9 620	4 370	2 285	2 964
HES	46 348	32 842	6 335	7 171	20 640	16 068	2 509	2 063
PNP	637	445	51	141	331	216	42	73
Total	70 229	45 239	12 080	12 910	36 913	24 674	6 336	5 903

R&D Personnel

The Higher Education Sector (HES) employed a total of 46 348 R&D personnel (HC) as researchers, technicians or other supporting staff. The sector accounted for 55.9% of the country's total R&D FTE (20 640 full-time equivalents). The second largest sector, in terms of R&D personnel, was the Government Sector (GOV) with 13 260 persons (HC) and 9 620 FTE, followed by the Business Enterprises Sector (BES) with 9 984 persons (HC) and 6 324 FTE.

FIGURE 3.1. R&D Personnel (in Head Counts and as % of total) by sector of performance, 2011

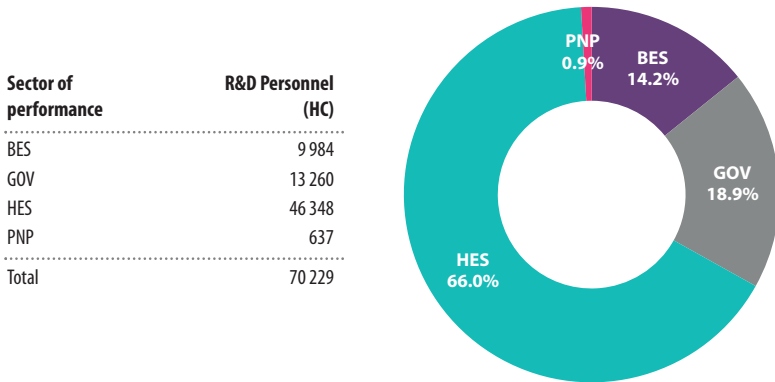
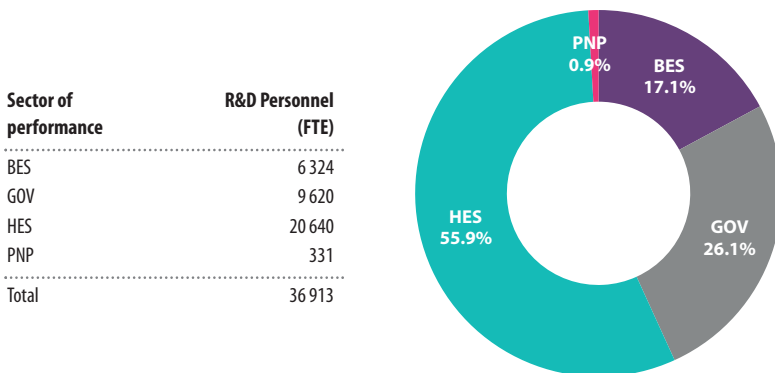


FIGURE 3.2. R&D Personnel (in Full-time Equivalents and as % of total) by sector of performance, 2011



Occupation

The largest proportion (64.4%) of total R&D Personnel were researchers (45 239 people in HC), followed by technicians (12 080 people or 17.2% of total R&D personnel) and other supporting staff (12 910 people or 18.4% of total R&D personnel).

FIGURE 3.3. R&D Personnel (in Head Counts) by occupation and sector of performance, 2011

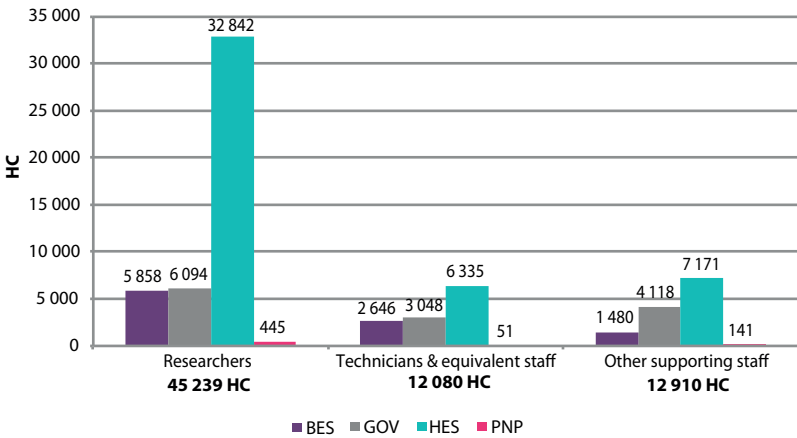
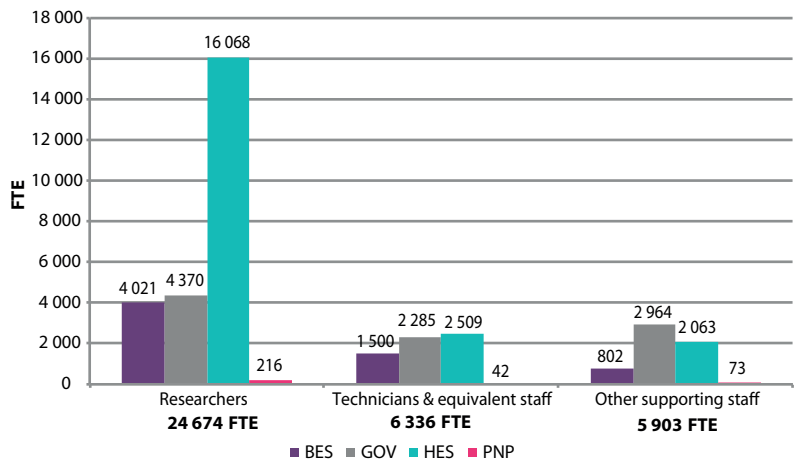


FIGURE 3.4. R&D Personnel (in Full-time equivalents) by occupation and sector of performance, 2011



In 2011, women accounted for 42.5% of total R&D personnel in head counts (29 879 people) and 41.9% of the respective total FTE (16 609 FTE). Female researchers represent 36.7% of total in HC and 38.9% of total in FTE. The largest share of female researchers was reported by the Government Sector (48.1% of total HC and 47.4% of total FTE in GOV).

FIGURE 3.5. Percentage (%) of women in total R&D Personnel and among researchers (in Head Counts and in Full-time equivalents), 2011

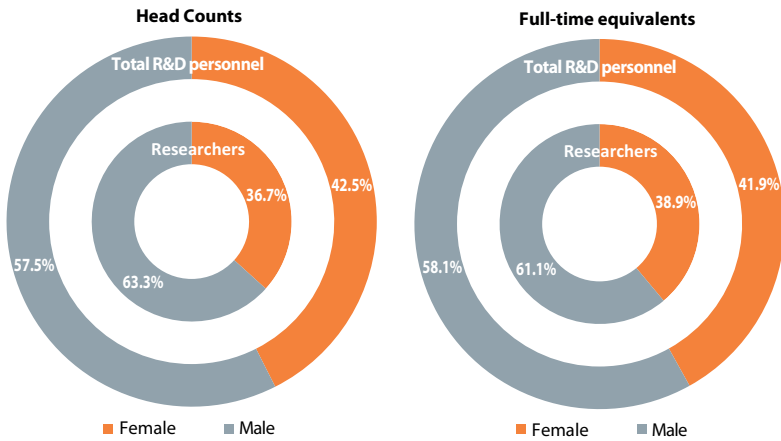
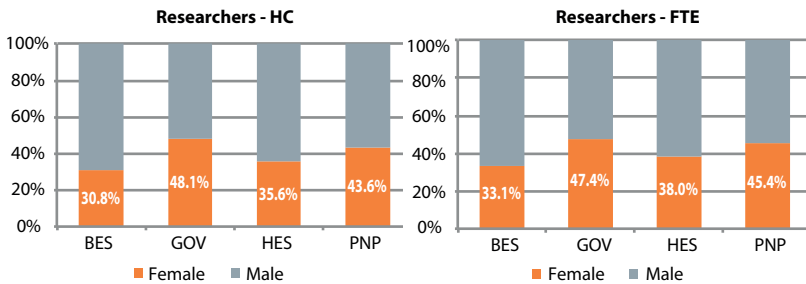


FIGURE 3.6. Percentage (%) of women among researchers (in Head Counts and in Full-time equivalents) by sector of performance, 2011



Qualification

Overall, R&D labour force in Greece is highly qualified. In 2011, almost 90% of total R&D personnel, expressed in full-time equivalents, were holders of Doctorate degrees and holders of Master's or Bachelor's degrees (R&D personnel at ISCED level 6⁶ accounted for 30.2% of total and at ISCED levels 5A & 5B accounted for 57.7% of total).

FIGURE 3.7. R&D Personnel (in Full-time equivalents and as % of total FTE) by qualification (ISCED 1997), 2011

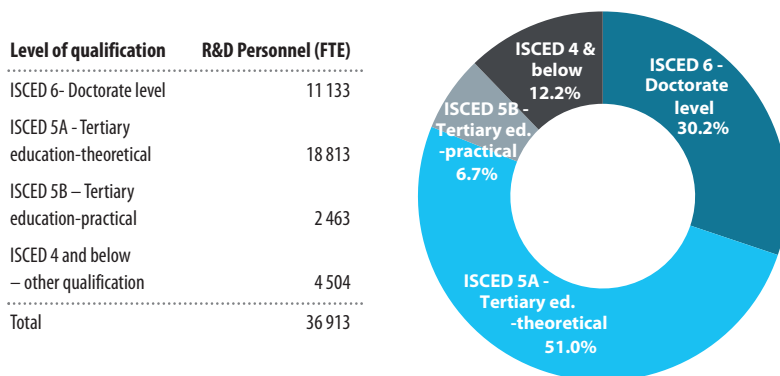
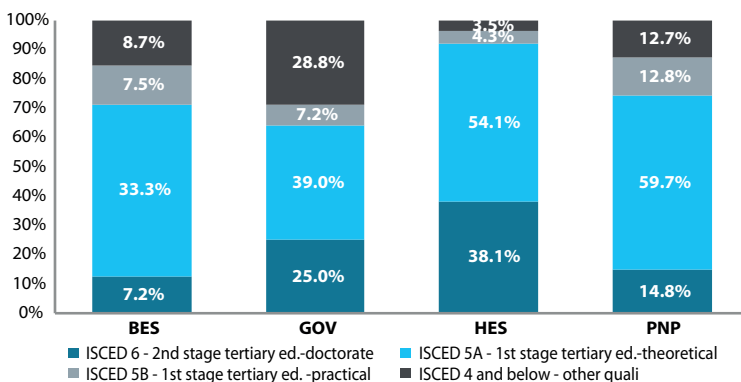
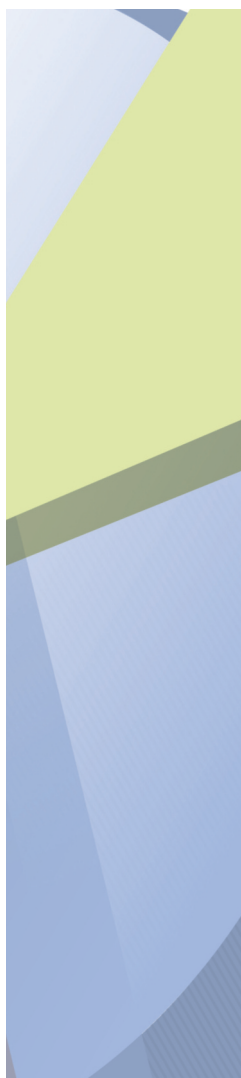


FIGURE 3.8. R&D Personnel (as % of FTE) by qualification (ISCED 1997) and sector of performance, 2011



6. ISCED 1997 is the International Standard Classification of Education maintained by UNESCO that is also used to describe educational attainment of R&D personnel <http://www.uis.unesco.org/Library/Documents/isced97-en.pdf>



CHAPTER 4

Regional Distribution of R&D

The following table presents the key R&D indicators (R&D Expenditure and R&D Personnel) in the thirteen Greek regions (NUTS 2)⁷.

TABLE 4.1: R&D Expenditure (in million EUR) and R&D Personnel (in Head Counts and in Full-time equivalents) by NUTS 2 regions, 2011⁸

Region (NUTS 2)*	R&D Expenditure					R&D Personnel	
	Total	Sector of performance				HC	FTE
		BES	GOV	HES	PNP		
ATTIKI	775.2	363.3	174.2	225.7	12.0	28 727	16 202
KENTRIKI MAKEDONIA	190.2	44.4	40.6	104.0	1.2	11 954	6 348
KRITI	106.1	6.5	48.0	51.6	0.0	6 179	3 671
DYTIKI ELLADA	72.1	11.3	4.2	56.6	0.0	3 832	1 993
ANATOLIKI MAKEDONIA, THRAKI	45.9	13.6	3.8	28.5	0.0	3 535	1 509
THESSALIA	42.5	1.1	11.7	29.7	0.1	5 499	2 165
STEREA ELLADA	42.1	32.1	7.6	2.3	0.1	1 120	767
IPEIROS	38.4	1.2	5.6	31.5	0.1	3 130	1 141
PELOPONNISOS	37.5	7.9	22.7	6.8	0.1	1 660	986
VOREIO AIGAIO	14.3	0.7	2.4	11.2	0.1	1 661	754
NOTIO AIGAIO	11.8	0.7	5.8	5.1	0.2	1 152	599
DYTIKI MAKEDONIA	11.6	2.8	2.6	5.9	0.2	1 535	638
IONIA NISIA	3.3	0.2	2.5	0.5	0.0	245	141
TOTAL	1 391.2	485.9	331.7	559.5	14.0	70 229	36 913

* regions are presented in descending order by R&D Expenditure

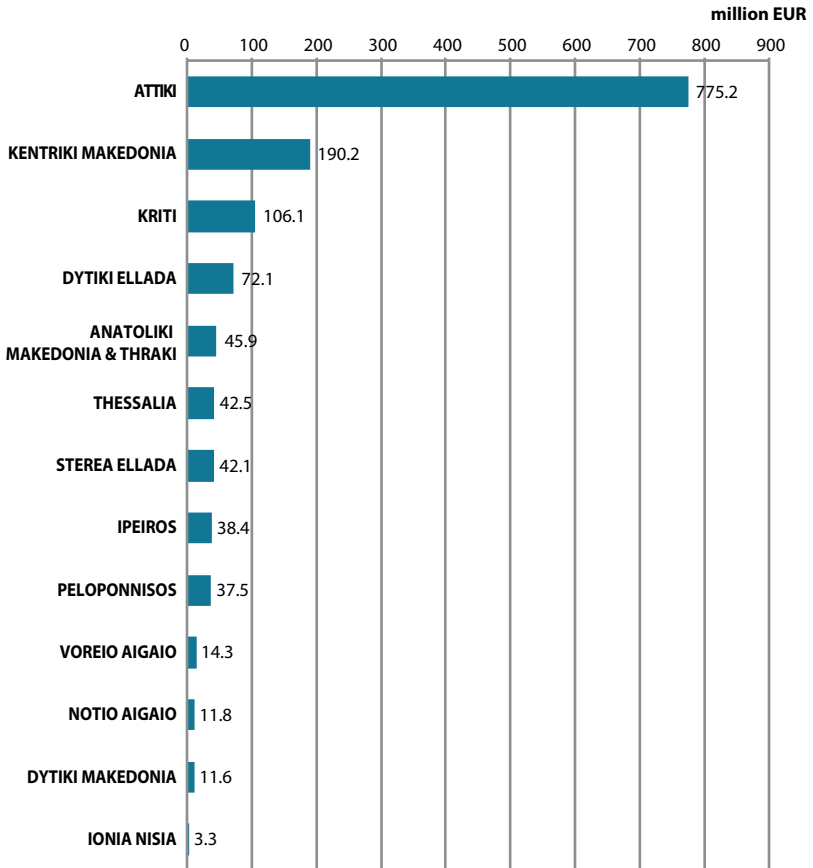
7. Statistical units are attributed to regions on the basis of the reported intensity of R&D performance of their regional units, rather than the postal address of the entity.

8. Differences between totals and components can be due to rounding.

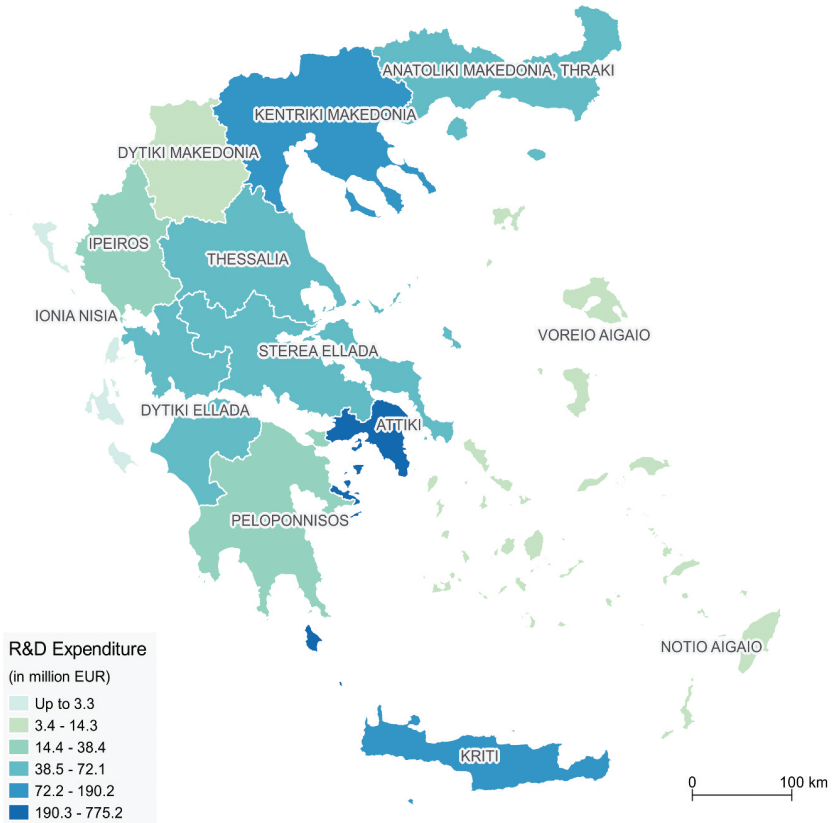
R&D Expenditure by region

In 2011, Attiki recorded the highest regional R&D Expenditure in Greece (55.7% of total or EUR 775.2 million), followed by Kentriki Makedonia (13.7% of total or EUR 190.3 million) and Kriti (7.6% or EUR 106.1 million).

FIGURE 4.1. R&D Expenditure (in million EUR) by NUTS 2 region, 2011



REGIONAL DISTRIBUTION OF R&D

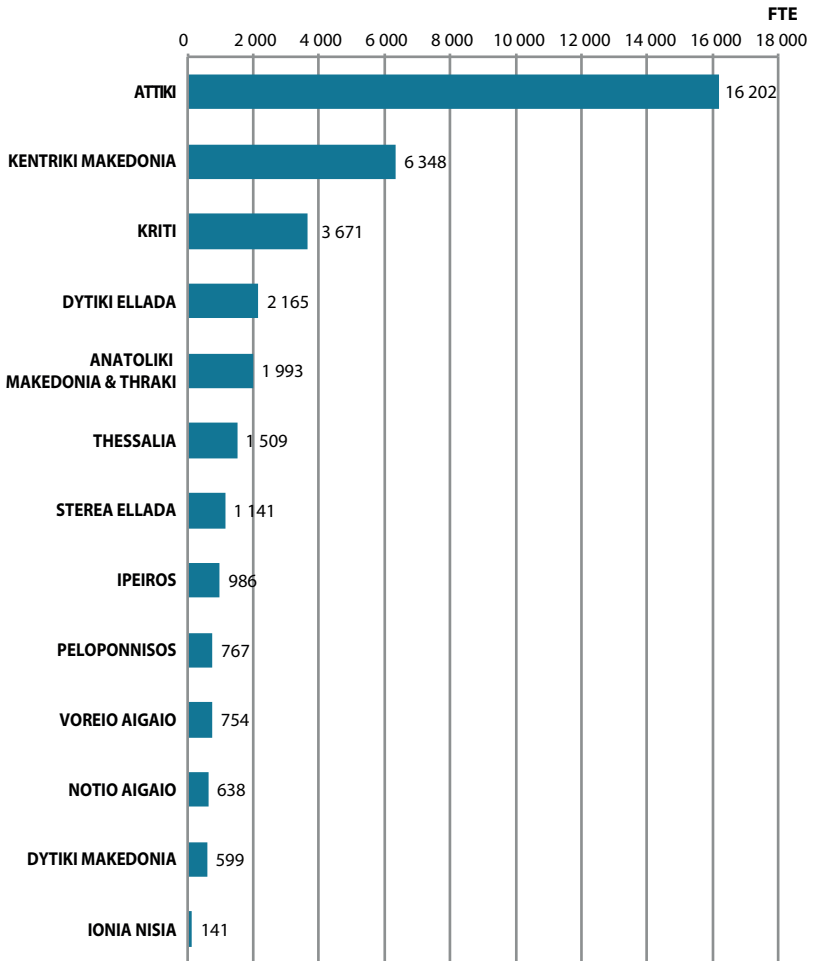


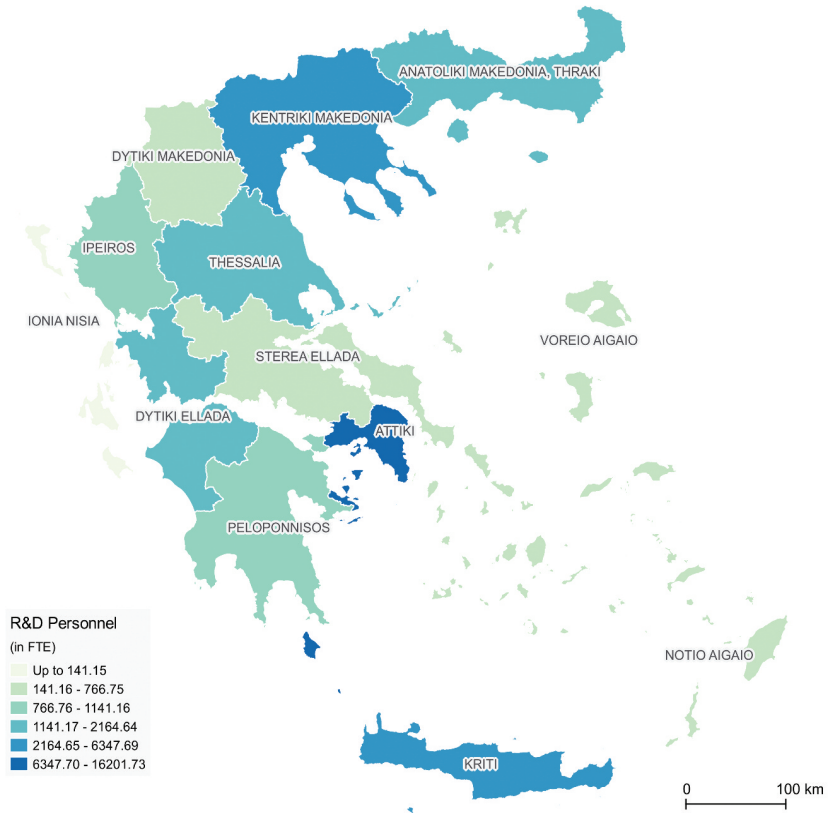
* The data classification method used was Jenks Natural Breaks Classification. The Jenks Optimal, or Jenks' Natural Breaks, Algorithm is a common method for classifying data presented in a choropleth map. The method optimizes the arrangement of a set of values into "natural" classes in order to best represent the actual breaks observed in the data. This is done by minimizing the average deviation from the class mean, while maximizing the deviation from the means of the other groups in a way that reduces the variance within classes and maximizes the variance between classes.

R&D Personnel by region

In 2011, Attiki recorded the highest R&D Personnel, expressed in full-time equivalents (43.9% of total or 16 202 FTE), followed by Kentriki Makedonia (17.2% of total or 6 348 FTE) and Kriti (9.9% of total and 3 671 FTE).

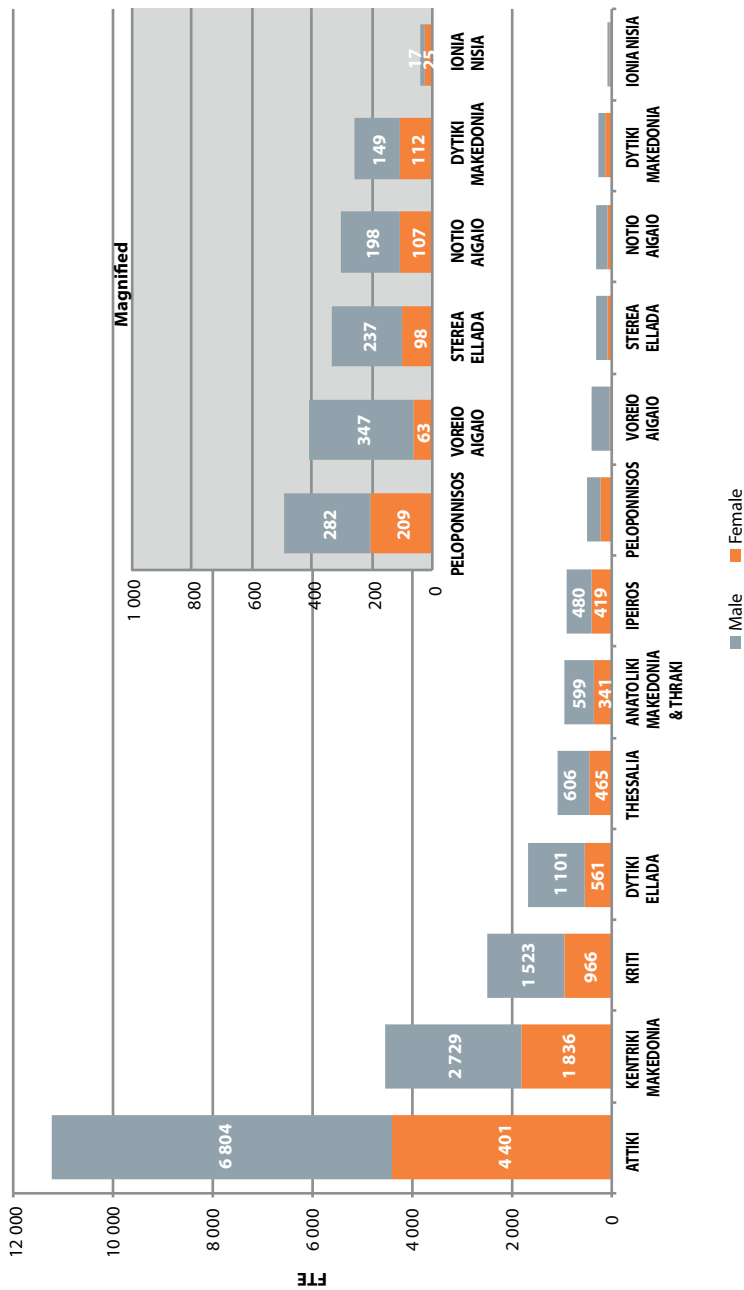
FIGURE 4.2. R&D Personnel (in Full-time equivalents) by NUTS 2 region, 2011





Especially for researchers, Attiki recorded 11 205 researchers in FTE (45.4% of total researchers in FTE). The gender dimension and distribution of researchers into males and females is shown in the following Figure.

FIGURE 4.3. Researchers (in Full-time equivalents) by NUTS 2 region and sex, 2011



Institutional distribution of R&D performance by region

The contribution that the different institutional sectors have in total R&D Expenditure and total R&D Personnel varies between regions. The following figures demonstrate that variation.

FIGURE 4.4. Percentage (%) distribution of R&D Expenditure by sector of performance in the NUTS 2 regions, 2011

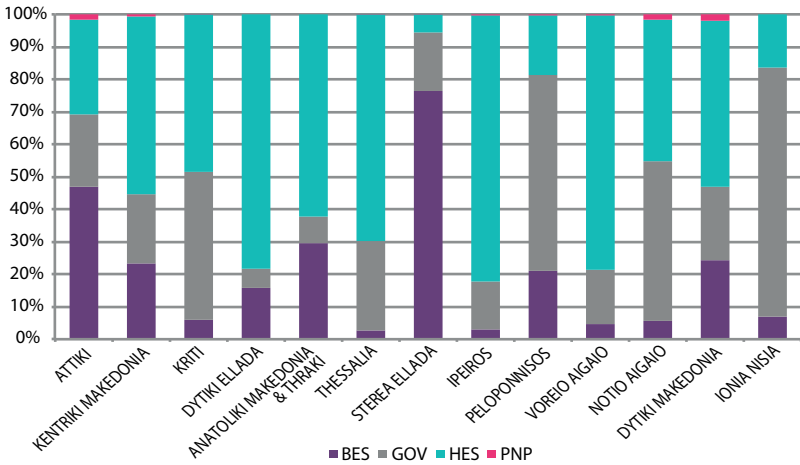
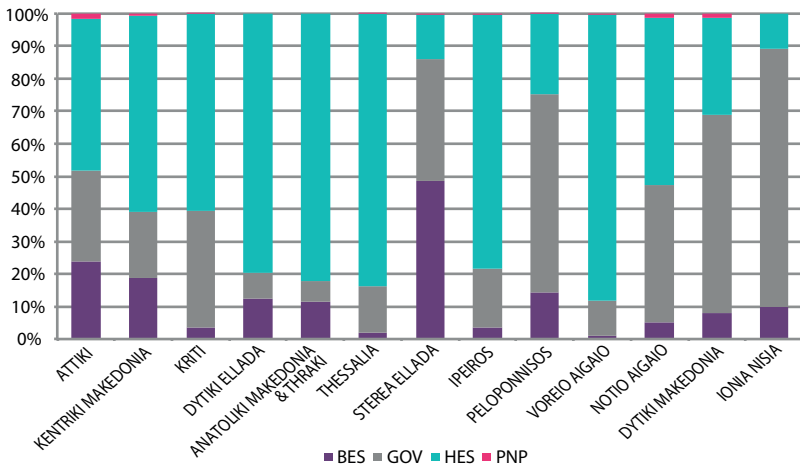


FIGURE 4.5. Percentage (%) distribution of R&D Personnel (in Full-time equivalent) by sector of performance in the NUTS 2 regions, 2011





CHAPTER 5

Business Enterprise Sector (BES)

Business Enterprise Sector (BES) includes all firms, organizations and institutions whose primary activity is the market production of goods or services (other than higher education)⁹. In addition, this sector includes public enterprises as well as non-profit institutions mainly serving the enterprises.

TABLE 5.1: **Main R&D indicators in BES, 2011**

R&D Intensity (% GDP)	0.23
Intramural R&D Expenditure (million EUR)	485.9
R&D Personnel (Head counts)	9 984
R&D Personnel (Full-time equivalents)	6 324
Researchers (Head counts)	5 858
Researchers (Full-time equivalents)	4 021

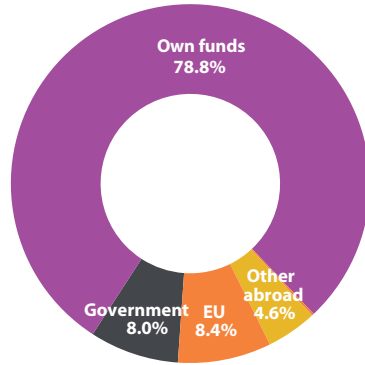
9. Minimum requirements for economic activity (NACE rev.2) and size class coverage are those determined by Commission Regulation 753/2004.

Source of funds

FIGURE 5.1. R&D Expenditure in BES (in million EUR and as % of BES total) by source of funds, 2011

Source of funds	R&D Expenditure (in million EUR)
Government	39.1
Businesses*	382.8
Other national sources	1.0
European Union	40.9
Other sources from abroad	22.1
Total	485.9

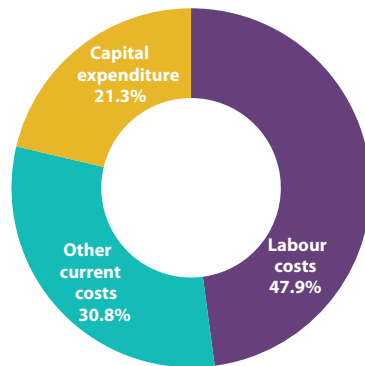
* Own funds



Type of costs

FIGURE 5.2. R&D Expenditure in BES (in million EUR and as % of BES total) by type of costs, 2011

Type of costs	R&D Expenditure (in million EUR)
Labour costs	232.7
Other current costs	149.7
Capital expenditure	103.4
Total	485.9



R&D Personnel

FIGURE 5.3. R&D Personnel in BES (in Head Counts) by occupation and sex, 2011

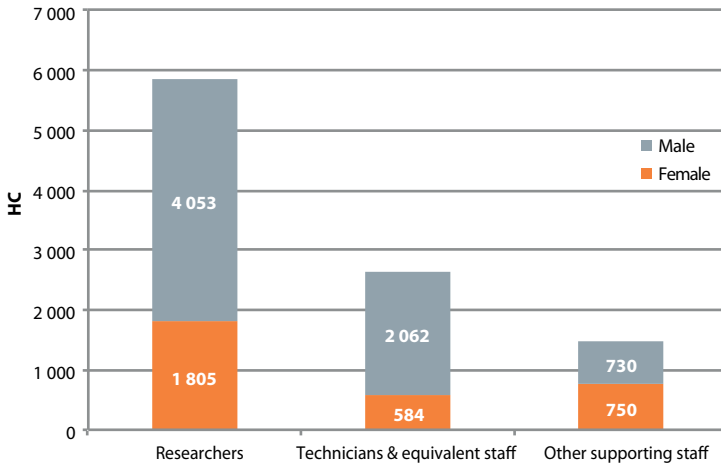
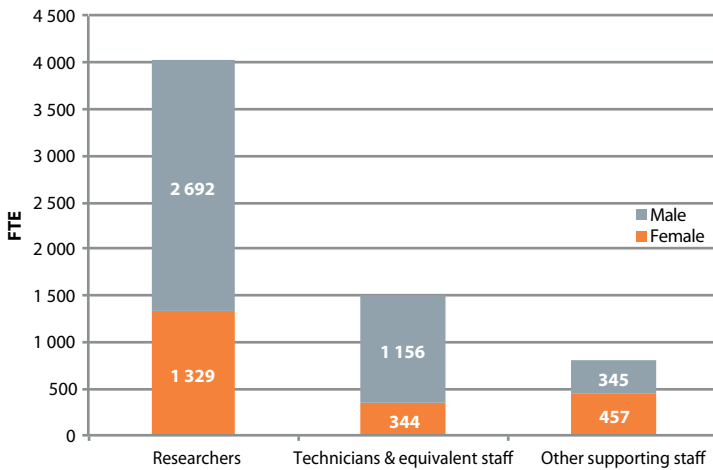


FIGURE 5.4. R&D Personnel in BES (in Full-time equivalents) by occupation and sex, 2011



R&D Statistics in BES by size class

FIGURE 5.5. R&D Expenditure in BES (in million EUR) by size class, 2011

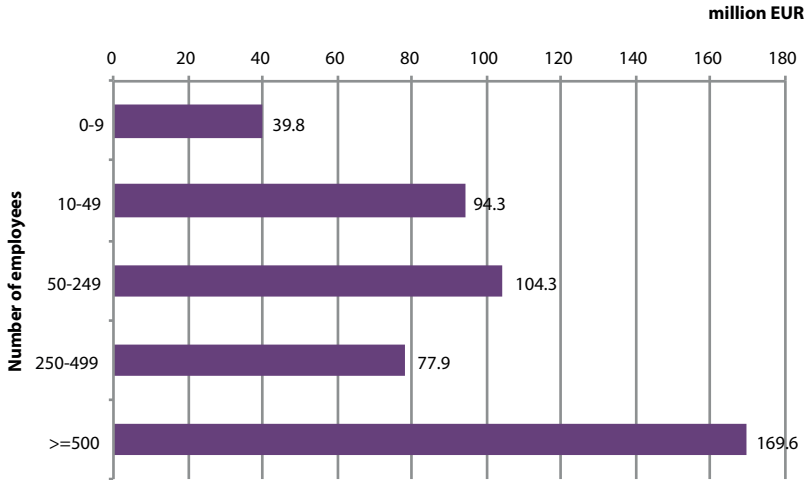


FIGURE 5.6. Percentage (%) distribution of R&D Expenditure in BES by source of funds in the different size classes, 2011

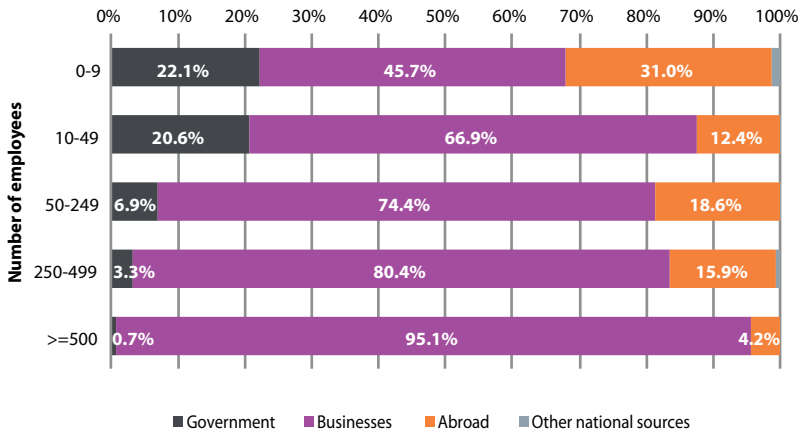
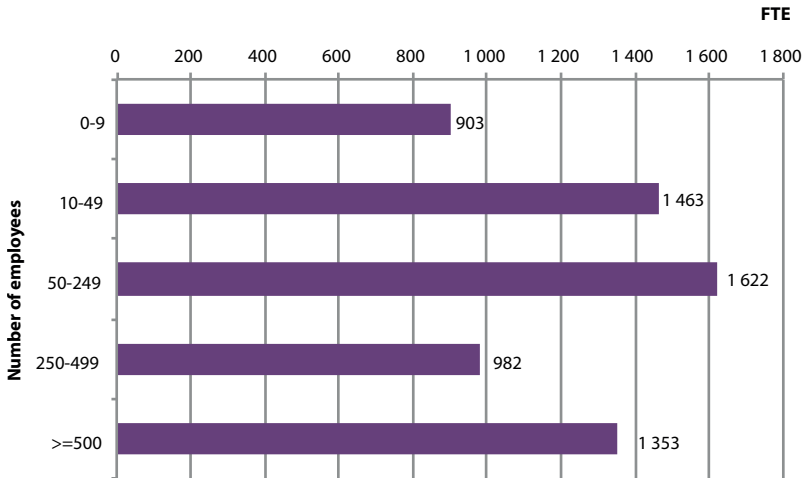


FIGURE 5.7. R&D Personnel (in Full-time equivalents) in BES by size class, 2011



R&D statistics in BES by economic activity (NACE rev2)

TABLE 5.2: R&D Expenditure in BES (in million EUR and as % of total BES) by economic activity (NACE rev2), 2011

Main sections of economic activity and most dominant sub-sections (NACE rev2 codes)	million EUR	% of total R&D Expenditure in BES
Services (45-82)	279.8	57.6%
Financial and insurance activities (64-66)	102.5	21.1%
Professional, scientific and technical activities (69-82)	77.3	15.9%
Information and communication (58-63)	69.9	14.4%
Manufacturing (10-33)	190.6	39.2%
Manufacture of fabricated metal products, computer, electronic and optical products, electrical equipment, motor vehicles, trailers and semi-trailers and other transport equipment (25-30)	60.7	12.5%
Manufacture of basic pharmaceutical products and pharmaceutical preparations (21)	60.3	12.4%
Manufacture of food, beverages, tobacco products (10-12)	16.9	3.5%
Other sections	15.4	3.2%
Electricity, gas, steam and air conditioning supply, water supply, sewerage, waste management and remediation activities (35-39)	6.2	1.3%
Construction (41-43)	5.4	1.1%
Agriculture, forestry and fishing (01-03)	1.5	0.3%
Total	485.9	

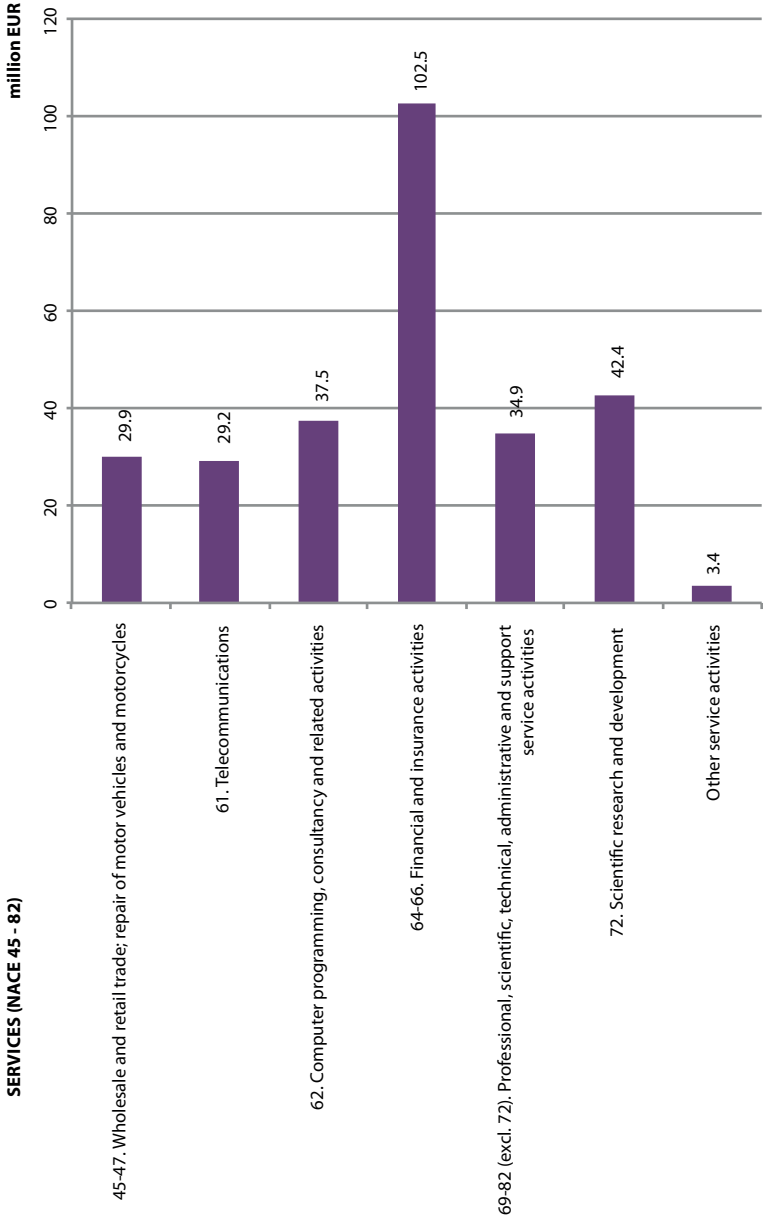
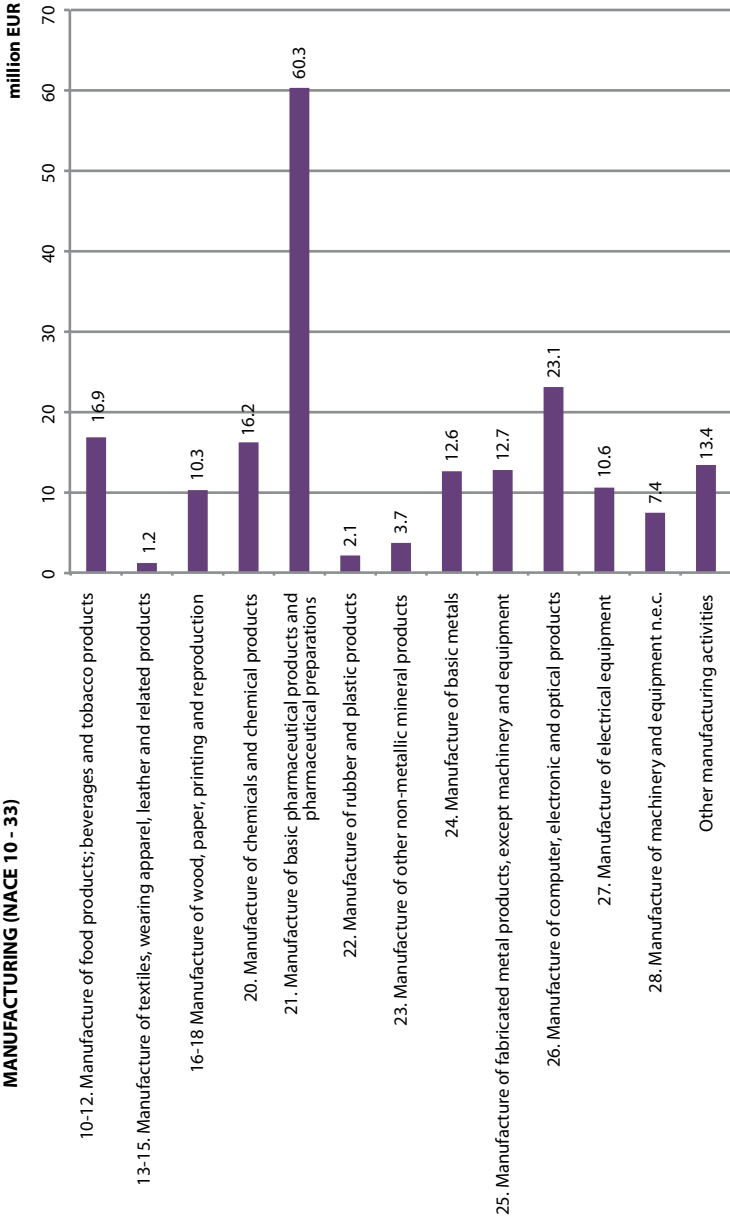


FIGURE 5.8. R&D Expenditure (in million EUR) in Services, NACE rev2, 2011

FIGURE 5.9. R&D Expenditure (in million EUR) in Manufacturing, NACE rev2, 2011

MANUFACTURING (NACE 10 - 33)





CHAPTER 6

Government Sector (GOV)

Government Sector (GOV) includes departments, offices and other bodies administered or / and financed by Ministries, such as the Public Research Centers that are supervised by the General Secretariat for Research and Technology (GSRT)¹⁰, other Public Research Institutions¹¹ supervised by different Ministries, archaeological and cultural institutions, museums, public hospitals, public independent authorities, etc.

TABLE 6.1: **Main R&D indicators in GOV, 2011**

R&D Intensity (% GDP)	0.16
Intramural R&D Expenditure (million EUR)	331.7
R&D Personnel (Head counts)	13 260
R&D Personnel (Full-time equivalents)	9 620
Researchers (Head counts)	6 094
Researchers (Full-time equivalents)	4 370

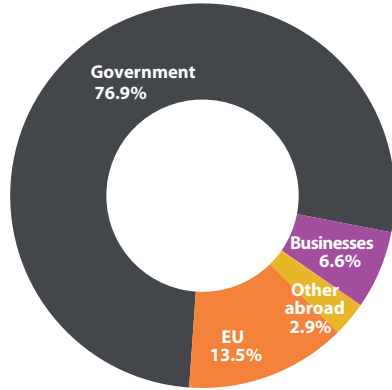
10. 12 Research Centers (in alphabetic order in Greek): National Observatory of Athens, National Hellenic Research Foundation, The Centre for Research and Technology, National Center for Scientific Research 'DEMOKRITOS', Hellenic Centre for Marine Research, National Centre for Social Research, Greek Atomic Energy Commission, Hellenic Pasteur Institute, "Alexander Fleming" Biomedical Sciences Research Center, Athena-Research and Innovation Center in Information, Communication and Knowledge Technologies, Foundation for Research & Technology – Hellas, Center for Research and Technology – Thessaly.

11. An indicative and non-exhaustive list of GOV institutions is the following: Academy of Athens, Biomedical Research Foundation Academy of Athens, Hellenic Agricultural Organisation DEMETRA (former National Agricultural Research Foundation - NAGREF), Benaki Phytopathological Institute, Center for Renewable Energy Sources and Saving, Mediterranean Agronomic Institute of Chania, Computer Technology Institute and Press "Diophantus", etc.

Source of funds

FIGURE 6.1. R&D Expenditure in GOV (in million EUR and as % of GOV total) by source of funds, 2011

Source of funds	R&D Expenditure (in million EUR)
Government*	255.2
Businesses	21.8
Other national sources	0.3
European Union	44.9
Other sources from abroad	9.5
Total	331.7

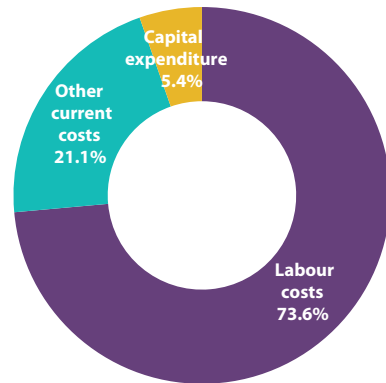


* 'Government' includes state budget as well as GOV institutions' own funds

Type of costs

FIGURE 6.2. R&D Expenditure in GOV (in million EUR and as % of GOV total) by type of costs, 2011

Type of costs	R&D Expenditure (in million EUR)
Labour costs	244.1
Other current costs	69.9
Capital expenditure	17.8
Total	331.7



R&D Personnel

FIGURE 6.3. R&D Personnel in GOV (in Head Counts) by occupation and sex, 2011

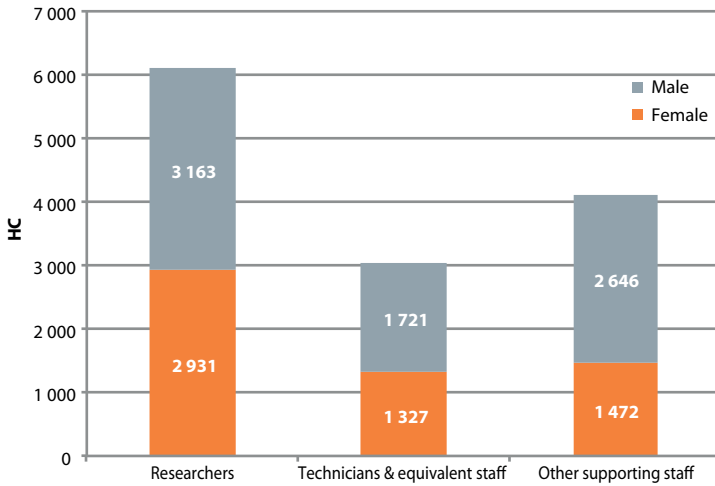
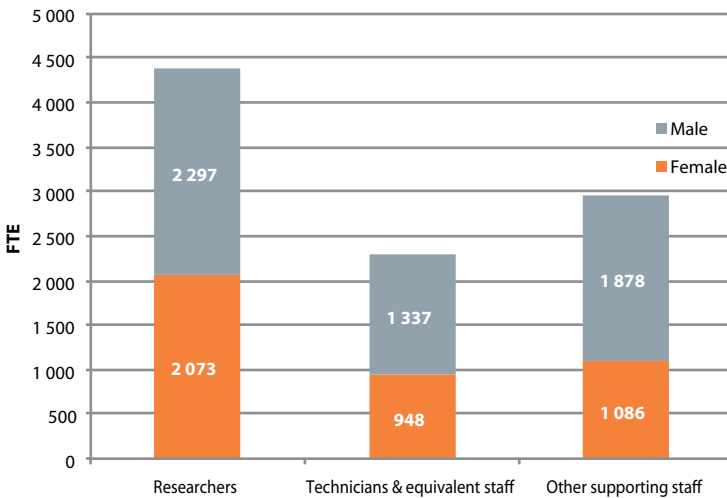
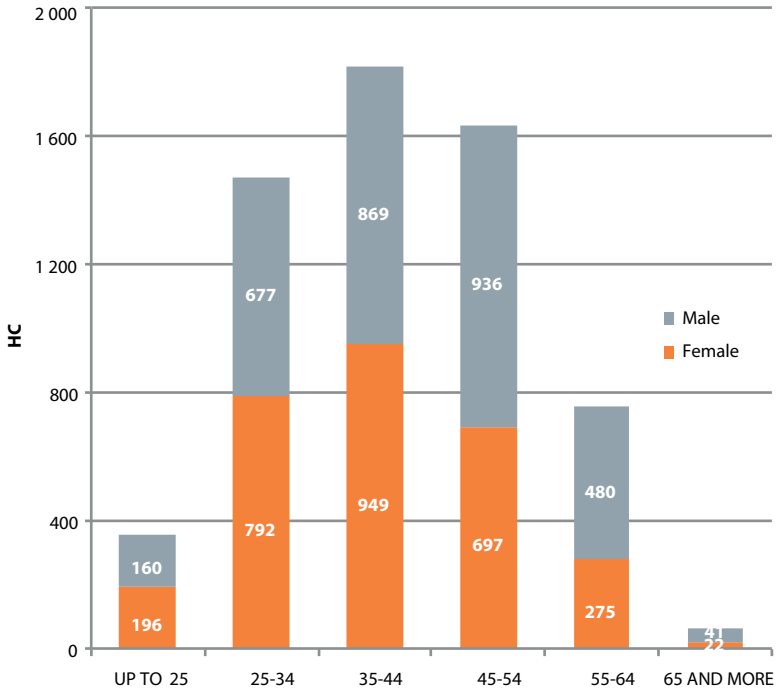


FIGURE 6.4. R&D Personnel in GOV (in Full-time equivalents) by occupation and sex, 2011



Demographic characteristics of Researchers (sex and age)

FIGURE 6.5. Number of researchers in GOV (in Head counts) by sex and age, 2011



CHAPTER 7

Higher Education Sector (HES)

Higher Education Sector (HES) includes Universities, Technological Educational Institutes (TEI), University research institutes (EPI), Technological Research Centres (KTE), Private Institutes of Vocational Training (IEK) accredited by the Ministry of Education and Religious Affairs, University Hospitals, other HE schools or academies¹².

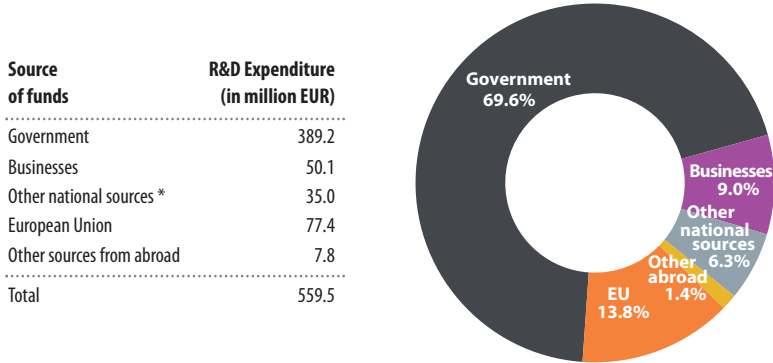
TABLE 7.1: Main R&D indicators in HES, 2011

R&D Intensity (% GDP)	0.27
Intramural R&D Expenditure (million EUR)	559.5
R&D Personnel (Head counts)	46 348
R&D Personnel (Full-time equivalents)	20 640
Researchers (Head counts)	32 842
Researchers (Full-time equivalents)	16 068

12. Higher Ecclesiastical Schools, Military academies, National School of Public Health, etc.

Source of funds

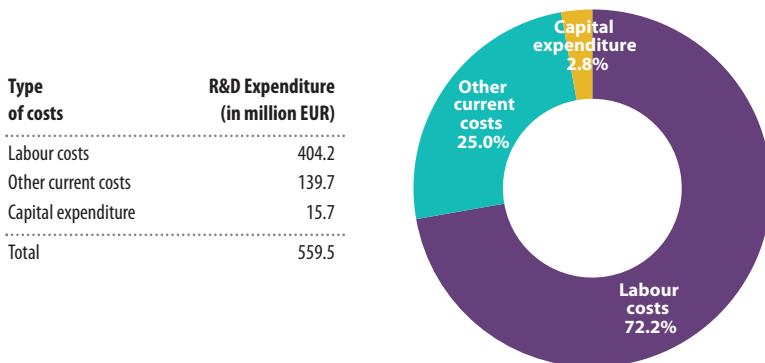
FIGURE 7.1. R&D Expenditure in HES (in million EUR and as % of HES total) by source of funds, 2011



*Other national sources include own funds of the HE sector, funding from PNP, inheritances, etc.

Type of costs

FIGURE 7.2. R&D Expenditure in HES (in million EUR and as % of HES total) by type of costs, 2011



R&D Personnel

FIGURE 7.3. R&D Personnel in HES (in Head Counts) by occupation and sex, 2011

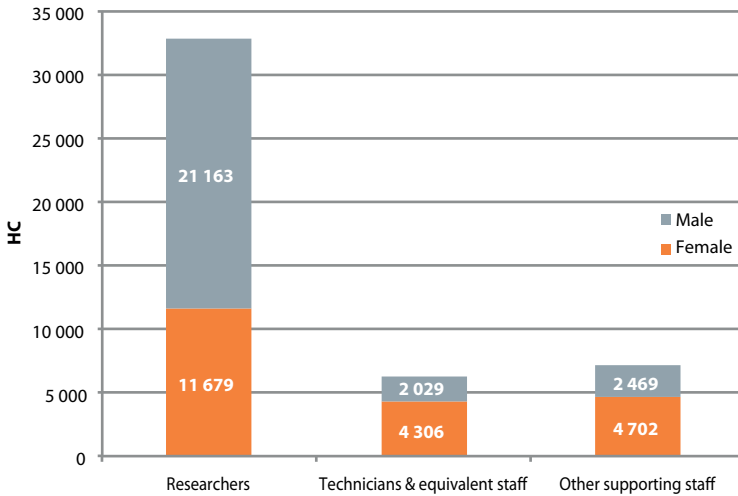
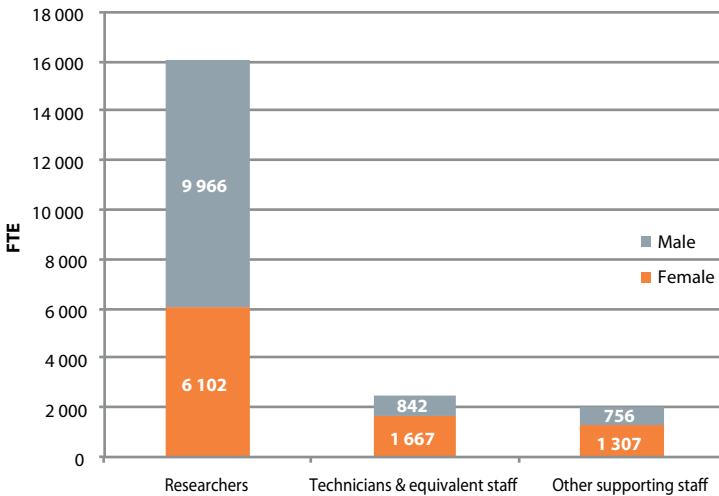
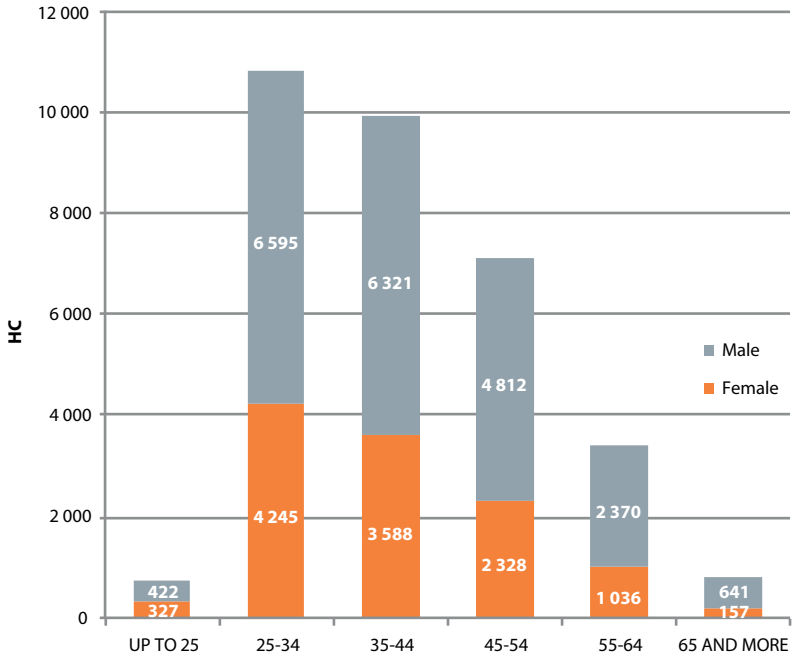


FIGURE 7.4. R&D Personnel in HES (in Full-time equivalents) by occupation and sex, 2011



Demographic characteristics of Researchers (sex and age)

FIGURE 7.5. Number of researchers in HES (in Head counts) by sex and age, 2011



CHAPTER 8

Private Non-Profit Sector (PNP)

Private non-profit sector includes non-market, private non-profit institutions serving the general public, such as non-market units, professional and learned societies, charities, relief or aid agencies, trades unions, consumers' associations, etc.¹³

TABLE 8.1: **Main R&D indicators in PNP, 2011**

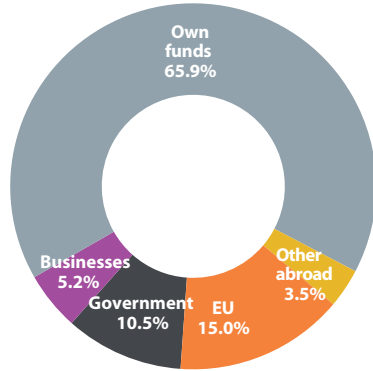
R&D Intensity (% GDP)	0.01
Intramural R&D Expenditure (million EUR)	14.0
R&D Personnel (Head counts)	637
R&D Personnel (Full-time equivalents)	331
Researchers (Head counts)	445
Researchers (Full-time equivalents)	216

13. An indicative and non-exhaustive list of PNP institutions is the following: Foundation of the Hellenic World, Hellenic Foundation for European and Foreign Policy, Hellenic Cooperative Oncology Group, Lambraakis Foundation, THORAX Institute, Environmental Centre ARCTUROS, WWW Hellas, Institute of Therapy and Environment, Hellenic Institute for Research on Cancer, etc.

Source of funds

FIGURE 8.1. R&D Expenditure in PNP (in million EUR and as % of PNP total) by source of funds, 2011

Source of funds	R&D Expenditure (in million EUR)
Government	1.5
Businesses	0.7
Other national sources (own funds)*	9.3
European Union	2.1
Other sources from abroad	0.4
Total	14.0

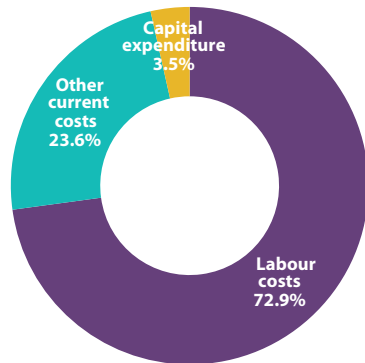


* Other national sources' includes own funds of PNP institutes

Type of costs

FIGURE 8.2. R&D Expenditure in PNP (in million EUR and as % of PNP total) by type of costs, 2011

Type of costs	R&D Expenditure (in million EUR)
Labour costs	10.2
Other current costs	3.3
Capital expenditure	0.5
Total	14.0



R&D Personnel

FIGURE 8.3. R&D Personnel in PNP (in Head Counts) by occupation and sex, 2011

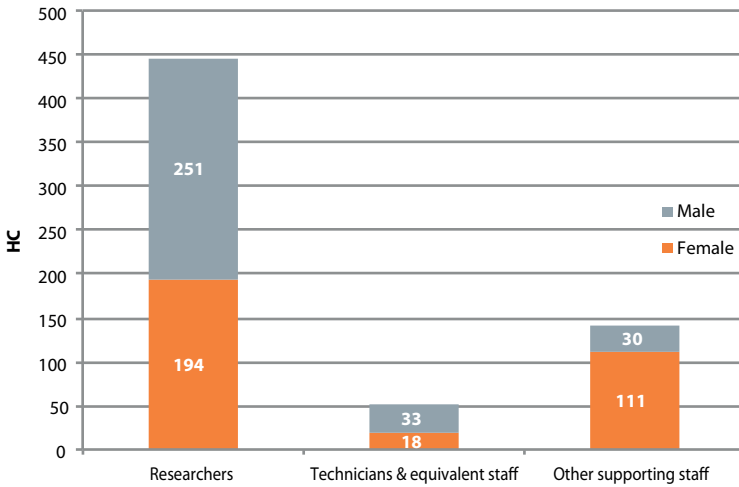
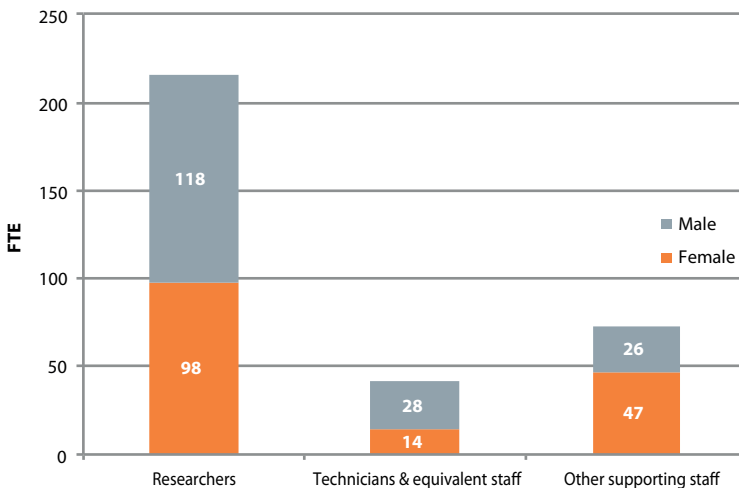


FIGURE 8.4. R&D Personnel in PNP (in Full-time equivalents) by occupation and sex, 2011





CHAPTER 9

Methodological Notes

Data description

The aim of the **R&D (Research and Development) survey** is to produce statistics about (intramural) R&D expenditure and R&D personnel. It covers R&D performing entities in the private and public sectors as follows: Business Enterprise Sector (BES), Government Sector (GOV), Higher Education Sector (HES), Private non-Profit (PNP) as well as for the country as a whole.

Personnel data are further broken down by gender, by occupation (researchers, technicians/equivalent staff, other supporting staff), by qualification, by major field of science, by region, by economic activity (NACE) and by size class (for BES only).

R&D (Intramural) Expenditure is further broken down by source of funds, by type of R&D ('basic research', 'applied research' and 'experimental development'), by type of cost ('current costs (labour costs and other costs)' and 'capital expenditure'), by major field of science, by economic activity (NACE) and by size class (for BES only).

R&D expenditure as a percentage of GDP is used to calculate the **R&D Intensity** of a country. This indicator is used *inter alia* to monitor progress towards the EU2020 target that 3% of the EU's GDP to be invested in R&D.

Institutional coverage

The main analysis of R&D statistics is by four **institutional sectors of performance**. Statistical units, from which data are collected, are therefore classified into the following four categories:

- **Business enterprise sector (BES)**, which includes all firms, organizations and institutions whose primary activity is the market production of

goods or services (other than higher education). In addition, this sector includes public enterprises as well as non-profit institutions mainly serving the enterprises. Economic activity (NACE rev.2) and size class coverage is defined in Commission Regulation 753/2004¹⁴.

- **Government (GOV) sector**, which includes all departments, offices and other bodies administered or / and financed by Ministries, such as the Public Research Centers that are supervised by the General Secretariat for Research and Technology (GSRT), other Public Research Institutions supervised by different Ministries, archaeological and cultural institutions, public hospitals, public independent authorities, etc.
- **Higher education sector (HES)**, which includes all Universities and Technological Educational Institutes (TEI), and moreover the University research institutes (EPI) and similar establishments in the Technological Educational Institutes (Technological Research Centres / KTE), University Hospitals, Private Institutes of Vocational Training (IEK) accredited by the Ministry of Education and Religious Affairs, as well as other HE schools/academies (e.g. Higher Ecclesiastical Schools, Military Academies).
- **Private non-profit (PNP) sector** that includes non-market, private non-profit institutions serving the general public, such as non-market units, professional and learned societies, charities, relief or aid agencies, trades unions, consumers' associations, etc.

Concepts and definitions

Basic statistical concepts and definitions, standard classifications and guidelines for the production of R&D statistics are outlined in the Frascati Manual (OECD, 2002).

Research & Development – R&D: According to the Frascati Manual, R&D comprise creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

The term R&D covers three activities: basic research, applied research and experimental development.

14. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2004R0753:20080101:EL:HTML>

- **Basic research** is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
- **Applied research** is also original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific practical aim or objective.
- **Experimental development** is systematic work, drawing on existing knowledge gained from research and/or practical experience, which is directed to producing new materials, products or devices, to installing new processes, systems and services, or to improving substantially those already produced or installed.

R&D covers both formal R&D in R&D units and informal or occasional R&D in other units.

Intramural R&D expenditure

R&D expenditure data are compiled on the basis of performers' reports of intramural expenditures. Intramural expenditures are all expenditures for R&D performed within a statistical unit or sector of the economy during a specific period, whatever the source of funds.

Both **current** (i.e. labour cost and other current cost such as non-capital purchases of materials, supplies and equipment to support R&D) and **capital expenditures** (i.e. expenditures on land and buildings, instruments and equipment) are included.

On the contrary, extramural expenditure made for the acquisition of R&D performed by other units and grants given to other for performing R&D are excluded.

R&D personnel

R&D personnel consists of all persons employed directly on R&D, as well as those providing direct services such as R&D managers, administrators, and clerical and staff.

R&D personnel includes the following categories.

- **Researchers:** Professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned. Postgraduate students at the PhD level also fall into this category.

- **Technicians:** Technicians are persons who participate in R&D by performing scientific and technical tasks, normally under the supervision of researchers, e.g. IT programmers, staff carrying out experiments, tests and analyses, staff carrying out bibliographic searches, carrying out statistical surveys and interview, etc.
- **Other supporting staff** includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects.

R&D personnel data is available in head count (HC) and in full-time equivalent (FTE).

Headcount (HC)

Headcount is the unit to measure the total number of persons who are mainly or partially employed on R&D. It allows links to be made with other data series, for example education or employment data or the results of population censuses.

Full-Time Equivalent (FTE)

Full-time equivalent (FTE) is the unit used to measure employed persons in a way that makes them comparable although they may work a different number of hours per week. It is therefore based on the time a person devotes on R&D activities.

FTE is calculated by comparing the time one devotes to R&D activities with full-time work. One FTE may therefore be thought of as one person-year, while for a part-time R&D worker FTE is calculated as the percentage of the time that he/she spends on R&D over his/her total working time.

Legal framework

R&D data collection is based on Commission Regulations No 753/2004¹⁵ (in effect until 2011) and 995/2012¹⁶ (from reference year 2012 onwards) on statistics on science and technology.

15. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CONSLEG:2004R0753:20080101:EL:HTML>

16. <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2012:299:0018:0030:EL:PDF>

The National Documentation Centre, the national institution for the collection, documentation and provision of science and technology content (www.ekt.gr), was assigned the responsibility for the collection and compilation of R&D statistics in April 2012 (Official Journal of Government 1359/B/25.04.2012) by the General Secretariat for Research and Technology (GSRT).

Data collection

The data are collected through census survey in all R&D performers in the BE, HE, GOV and PNP sectors. For the needs of the survey, EKT developed dedicated register of all known R&D performers, based on information from administrative sources. The R&D register is updated on a systematic basis.

The data were collected via electronic questionnaire through the online platform <http://metrics.ekt.gr>. The questionnaire was addressed to more than 2 000 performers.

Open source software has been used to develop the IT infrastructure to support the survey, i.e. data collection, progress monitoring, data analysis, etc.

Data validation and editing has been performed in collaboration with respondents, whenever necessary. Consistency checks have also been conducted between the collected data and relevant data provided by the following administrative sources:

- Monitoring Information System (M.I.S.) the central information system about projects financed under the National Strategic Reference Framework (NSRF) – Source: *Special Service for the Monitoring Information System (M.I.S.)*
- eCORDA database with information about signed grants and beneficiaries with regards to EU Framework Programme for Research (FP7) - Source: *European Commission*
- General University Funds (GUF) and University personnel data – Source: *Ministry of Education and Religious Affairs*
- Private Balance Sheets database – Source: *ICAP*
- GBAORD data – Source: *Official GBAORD data* that have been collected and compiled by EKT and made available in Eurostat dissemination database.

In addition, the Hellenic Statistical Authority (EL.STAT.) performed consistency checks between R&D expenditure data collected through the R&D survey and the Structural Business Survey (SBS).

Data processing and data analysis have been conducted using standard methodological techniques and Eurostat guidelines on the harmonized production of R&D statistics across Member States.

Key methodological issues have been discussed and finalized in collaboration with the General Secretariat for Research and Technology (GSRT) and the Hellenic Statistical Authority (EL.STAT.).



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