Reviews of National Policies for Education

Tertiary Education in Portugal

BACKGROUND REPORT

MINISTRY OF SCIENCE, TECHNOLOGY
AND HIGHER EDUCATION

Lisbon, 2006

TERTIARY EDUCATION IN PORTUGAL: BACKGROUND REPORT

In June 2005, the Portuguese Minister of Science, Technology and Higher Education, José Mariano Gago, approached the OECD to conduct a review of the Portuguese higher education system, under the Education Committee's programme of national reviews. The report of the OECD review team draws upon the Background Report prepared by Portuguese authorities, literature searches and evidence gathered during a two-week study visit to Portugal in May 2006. Published by the OECD in 2007, *Reviews of National Policies for Education: Tertiary Education in Portugal* (ISBN 978-92-64-00975-2) contains the analysis and recommendations of the review team.

This Background Report, prepared by Portugal's Ministry of Science, Technology and Higher Education, is available at <http://dx.doi.org/10.1787/104853273381> and on the OECD website at www.oecd.org/edu/reviews/nationalpolicies.

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PREFACE

This Background Report provides an overview of the tertiary education system in Portugal and raises the main concerns that need political attention. It was written based on the terms of reference agreed in November 2005 between the Portuguese Government and OECD and considers the guidelines provided by OECD in January 2006 for the accomplishment of the evaluation exercise.

The report includes information on the Portuguese tertiary education system, including statistical data, legislation and installed capacity. It also considers a characterisation of the number, type, dimension, geographical location and distribution of the higher education institutions, as well as their study programmes and networking activities, including both public and private, university and polytechnic institutions and addressing at least the following topics: access to tertiary education; the profile of the students' population; enrolment trends; funding schemes and levels; research assessment and statistics.

The writing-up of this report included a throughout discussion with major actors in tertiary education, following the circulation of an initial draft document in March 2006. The final version includes many of the contributions received. In addition, it should be remembered that the OECD invited all interested parties to submit directly their own views and reflections on the Portuguese tertiary education.

In this context, thanks are due to those individuals and institutions that helped in various ways, including the National Council of Education, CNE, the Council of Rectors, CRUP, the Council of Polytechnic Institutes, CCISP, The Association of Private Institutions of Higher Education, APESP, the Council of Associate Laboratories, CLA, the Confederation of Industries, CIP, the Association of Industries, AIP, and the various unions and students' associations that have provided continuous criticism, comments and information that allowed the preparation of the report.

It is also acknowledged the contribution of all the institutions that made available the information necessary for the report, including the Directorate General for Higher Education, DGES, the Observatory for Science and Higher Education, OCES, the Planning Office, GEFCEs, and the Foundation for Science and Technology, FCT.

Lisbon, May 5, 2006
Manuel Heitor
Secretary of State for Science, Technology and Higher Education

INTRODUCTORY NOTE

The review of the tertiary education system and policies commissioned by the Portuguese Government to the OECD in November 2005 is expected to examine the performance of the Portuguese tertiary education by reference to other OECD countries and to provide recommendations for its improvement. The goal is to conduct an extensive, independent and objective assessment of the Portuguese system of tertiary education following international criteria with the ultimate goal of guiding the reorganisation and rationalisation of the system.

The review is being complemented by two other major exercises. First, the European Network for Quality Assurance in Higher Education, ENQA, will review the accreditation and quality assurance practices of the Portuguese tertiary education and will provide advice on appropriate structures for implementing a national accreditation and evaluation agency following examples of quality assurance and accreditation practices in Europe. Second, an independent, voluntary and objective review of Portuguese higher education institutions (universities and polytechnics, public and private, and their units) was launched under the coordination of the European University Association, EUA, following international criteria.

The overall exercise was designed to ensure that the tertiary education system and its stakeholders gain maximum benefit from comprehensive evaluations by teams of experienced international experts and that the procedures and processes in place in the Portuguese tertiary education system can be benchmarked against best practice internationally. The Government will use the results of the review as a contribution to the decision-making process of reforming the Portuguese tertiary education.

In this context, and following the terms agreed with OECD, the Background Report provides an overview of the tertiary education system in Portugal to support the evaluation exercise. It was based on a thorough discussion with major actors in tertiary education, following the circulation of an initial draft document in March 2006. The final version includes written contributions received from many of those actors and thanks are due to many individuals and institutions that helped in various ways.

The report raises various concerns that need political attention and the reviewers will certainly select those that require particular analysis. Nevertheless, from a national point of view, particular attention should be focused on the following points of concern:

1. Regulating and accrediting the supply of tertiary education: how to foster diversity and quality, with the necessary specialisation? Which level of public regulation to facilitate the adequacy of the supply of tertiary education to the labour market? How should tertiary education contribute to the reform and promotion of the knowledge base of the Portuguese labour market? The structure and network of tertiary education institutions is a major concern. The system grew unabated in the last decades, with a number of institutions achieving excellence, but many others still requiring human resources to provide quality education and research. Initially the growth and rapid increase in the number of higher education institutions responded to student demand, but this slowed down due to declining student enrolment. At the same time, the needs of the labour market have changed. The use of the *numerus clausus* as policy instrument became increasingly questioned in many fields of study. As a result, the objective and mission of public and private universities and polytechnics need clarification, while the rationalisation of the system requires attention. The main issues to be assessed include the number and type of higher education institutions; the accreditation of degree courses; the geographical spread of higher education institutions throughout the country, as well as the level of internationalization of most institutions. But in order to address the overall system, it is important to look carefully at the various sub-systems, in a way that fosters their individual and specific characteristics. How can the binary model (university – polytechnic) best meet the needs of the Portuguese society, given the historical context in which its higher education institutions developed? Should public policies differentiate the adequacy of the supply of tertiary education to the labour market in function of the specific characteristics of each sub-system?
2. Strengthening scientific excellence in higher education: Which level of public funding to guarantee the adequate level of science and technology and the growth of the knowledge base? What are the implications for the organisation of the supply of higher education and, in particular, for post-graduation education? Which research and academic careers? Strengthening

science and technology in Europe became a major concern, while the duality between research intensive universities and teaching institutions was strengthened in many countries. At the same time, the need to promote learning societies leading to knowledge economies called increasing attention to the role of research in any learning environment. How to promote at the same time scientific excellence and the growth of the knowledge base? Does Portugal provide enough human resources to fulfil this ambition, as well as adequate access to research infrastructures and skills? How to ensure that all students in any Portuguese higher education institution have access to quality research? How to regulate and organise the supply of undergraduate and post-graduate degree programmes in order to guarantee the necessary research-based environments for higher education? Which should be the level of national and international networking of research centres, the role of associated laboratories and of other R&D institutions beyond the higher education system? Still under this context, it is clear that women have a remarkable significant participation in Portuguese higher education and science, but their participation in S&T careers remained low at senior levels. In addition, while the attractiveness of research careers was the focus of much policy action throughout OECD countries, which policy measures should be implemented to foster modern academic and scientific careers in Portuguese higher education institutions? How can public policies foster a network of Portuguese institutions competing internationally with an increasingly diversified and sophisticated system of institutional arrangements and research and academic careers?

3. Governance and institutional autonomy in higher education: Which legal statutes and frameworks to foster modern institutions? New structures of governance of tertiary education have been layered in Portugal, as well as in many other OECD countries, creating an amalgam of complex, and sometimes ineffective, systems of governance. Nevertheless, the majority of the systems of tertiary education remain within public administration, with teachers, researchers and staff managed as public servants. This led many authors to argue that tertiary education needs modern and efficient governance systems, focusing on the emerging challenges and opportunities facing institutions and their resources. They need to be attuned to the social and economic needs of the country, as well as to the increasingly emerging opportunities of science and technology. This requires an examination of the legal status and regulatory framework of the tertiary education institutions to make them more responsive to societal needs, but in a way to foster their own independence in guiding the frontiers of science and knowledge.
4. Broadening the tertiary education spectrum: How to enlarge the number of students and help qualify the Portuguese population? Which social support and loan systems? Despite the large increase in tertiary education over the last decades, Portugal is still characterised by low qualification levels of the population in general, together with high retention and drop-out rates from the education system. Which public policies need implementation to guarantee broadening access to higher education and to foster post-secondary education? How can policy measures facilitate tertiary education institutions to attract new publics for lifelong learning, adult and vocational training? Furthermore, under the current financial restraints, how to ensure equity in the access to tertiary education, together with adequate loan and social support systems to students?

Improving the understanding of these main aspects of concern will contribute for implementing the necessary system level reforms, including the definition of the network of tertiary education institutions and study programmes, widening participation to non-traditional publics and promoting lifelong education activities in order to develop a national system of tertiary education following best worldwide concepts.

In order to achieve these objectives, the Background Report provided basic information to the OECD team of evaluators, which was complemented with interviews, meetings and visits to a number of people

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and institutions. In addition, the OECD invited institutions, teachers, students, unions and professional associations to submit their own independent brief assessments of the tertiary education in Portugal, so that complementary views of emerging challenges will be brought together. The review took place in the wider context of the Government's strategic objective of guarantying a system of tertiary education fully integrated at the European level, namely in terms of quality, levels of participation and employability of graduates.

Thanks are due to all the institutions that made available the information necessary for the report.

List of Abbreviations

ADISPOR	Association of the Portuguese Polytechnics Institutes
APESP	Portuguese Association of Private Higher Education Institutions
Adi	Innovation Agency
CCISP	Coordinating Council of the Portuguese Polytechnics Institutes
CERN	European Organisation for Nuclear Research
CET	Specialised Technology Courses
CESE	Specialised Higher Education Courses
CIES	Centre for Research and Studies in Sociology
CIRIUS	Research Centre on Regional and Urban Economics
CLES	Comprehensive Law of the Education System
CNASES	National Council of Student Social Support
CNAVES	National Council for Evaluation of Higher Education
CRUP	Council of Rectors of Portuguese Universities
DAPP	Department for Evaluation, Prospective and Planning (Ministry of Education)
DEPGEF	Department for Financial Management and Planning
DGES	Directorate General for Higher Education
EFTA	European Free Trade Association
EHEA	European Higher Education Area
EMBL	European Molecular Biology Laboratory
EMBO	European Molecular Biology Organisation
ESA	European Space Agency
ESF	European Social Fund
ESO	European Southern Observatory
ESRF	European Synchrotron Research Facility
EU	European Union
EUROSTAT	Statistical Office of the European Communities
FAE	Federation of Student Unions
FCT	Foundation for Science and Technology
FEANI	European Federation of Engineering National Associations
FTE	Full Time Equivalent
FUP	Foundation of Portuguese Universities
GDP	Gross Domestic Product
GNP	Gross National Product
HEI	Higher Education Institution
ICT	Information and Communication Technologies
IICTI	Research Institute for Industrial Science and Technology
INE	National Institute for Statistics
ISCED	International Standard Classification of Education
ISCTE	Higher Institute for Work and Enterprise Sciences
IT	Information Technologies
JNICT	National Committee of Scientific and Technological Research
MCTES	Ministry for Science, Technology and Higher Education
NEOTEC	New Technologies Initiative
NEST	New Technology Based Companies
NUTS	Nomenclature of Territorial Units for Statistics
OCES	Observatory of Science and Higher Education
OCT	Observatory of Sciences and Technologies
PALOPs	African Countries with Portuguese as Official Language

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POCTI	Operational Program for Science, Technology and Innovation
POSI	Operational Program for Information Society
RCTS	Network of Science, Technology and Society
R&D	Research and Development
SILATEE	Longitudinal Information System for Following the Entrepreneurial Trajectories and Enterprises
S&T	Science and Technology

PART I - THE CONTEXT

1. Introduction to the tertiary education system in Portugal

The current evaluation of the Portuguese tertiary education system takes place in a period of slightly declining and/or relative stagnation in the growth of students after a period of more than 30 years of consecutive growth (Figure 1.1). The system grew from 30,000 students in the sixties to nearly 400,000 students by the end of the 20th century. This rapid increase in the student population, comparatively to the development in other European countries during the same period (Figures 1.2 and 1.3) should be acknowledged, although the recent decrease in the number of students since 2002 was expected for a number of years based on several estimates^{1, 2}. This raises a series of new challenges and opportunities for the higher education system, in terms of strengthening its capacity and level of specialisation, as well as broadening the qualification of the Portuguese population and its knowledge base in an international context.

Figure 1.1 – Evolution of the overall number of students (graduate and post-graduate) enrolled in higher education in Portugal, 1990/91 – 2005/06

Source: OCES-MCTES.

¹ CIPES, *Previsão da Evolução do número de alunos e das necessidades de financiamento Ensino Superior 1995 a 2005*, February 1999, which forecasted an expected decrease of 32,600 students of the 12th year (or 26.6%), between 1995/¹⁹⁹⁶ and 2005/2006.

² Expectation of decrease in the number of students of the secondary education of 51,442 students of the 12th year, between 1997/1998 e 2002/2003, as in “Alunos matriculados no ensino público e privado – Evolução e projecção” em: <http://www.min-edu.pt/Scripts/ASP/estatisticas.asp>

Figure 1.2 – Total number of students in the higher education system for the period 1960-2002 in a selected group of small European countries

Source: Conceição and Heitor, (2005), "Innovation for All? Learning from the Portuguese path to technical change and the dynamics of innovation". Westport and London: Praeger; Primary data from Eurostat, UOE, INE, DAPP.

Figure 1.3 – Compound annual growth rate of the number of students enrolled in tertiary education (ISCED 5 and 6), 1975/76 – 2000/01

Source: Eurydice (2005), Key data on Education in Europe 2005, Luxembourg, Office for Official Publications of the European Communities

The female population represented about 61% of the total number of students enrolled in the Portuguese tertiary education in 2004 (Figure 1.4), with 55% of all students staying with their families after enrolment in tertiary education (Figure 1.5). This shows a pattern typical of other southern European countries.

Figure 1.4 – Overall percentage of women enrolled in higher education, 2004

Source: CIES-ISCTE, Eurostudent 2005

About 24% of higher education students receive direct public support in the form of a grant (Figure 1.6), similar to Spain and considerably higher than that of Italy, but still considerably smaller than those typical of northern European countries. Although the grant amounts may differ the Portuguese grants are provided through the system of social support. In addition, a very limited and reduced loan system is provided through commercial banks, at commercial rates.

Figure 1.5 – Overall percentage of students staying at their parent's house, 2004

Source: CIES-ISCTE, Eurostudent 2005

Source: CIES-ISCTE, Eurostudent 2005

Figure 1.6 – Percentage of students receiving direct public support, 2004

Source: CIES-ISCTE, Eurostudent 2005

Occupancy of student residences covers only about 4% of the total population in higher education and, therefore, is still comparatively lower than in most European countries (Figure 1.7). Most students live with their family.

Figure 1.7 – Percentage of students staying at student residences, 2004

Source: CIES-ISCTE, Eurostudent 2005

Figures 1.8 and 1.9 show that a large fraction of the students' income is provided by their families, independently of where the students are living, in a way that differs from most European countries.

Figure 1.8 – Relative level of the sources of income for students staying at their parent's house, 2004;

Source: CIES-ISCTE, Eurostudent 2005

Figure 1.9 – Relative level of the sources of income for students that are not staying at their parent's house, 2004;

Source: CIES-ISCTE, Eurostudent 2005

Higher education is provided through a diversified system of institutions (Table 1.1), including 27 universities, 40 university schools (not integrated), 17 polytechnic institutes and 76 polytechnic schools (not integrated), with an overall of 160 units. This includes 14 Public universities, with 6 of them organised in 48 schools (i.e., “faculdades”).

Table 1.1 – Number of university and polytechnic institutions, 2006

	University		Polytechnic	
	Universities	Other Schools (not integrated)	Polytechnic Institutes	Other Schools (not integrated)
Public	14	5	15	16
Private	13	35	2	60
TOTAL	27	40	17	76

The system includes 15 Public Polytechnic Institutes and 2 Private Polytechnic Institutes. Table 1.2 quantifies the network of polytechnic schools, including those integrated in universities and in polytechnic institutes, with an overall number of 173 schools.

Table 1.2 – Number of polytechnic schools, 2006

	Polytechnic schools integrated in polytechnic institutes	Polytechnic schools integrated in universities	Other polytechnic schools (not integrated)	TOTAL
Public	75	15	16	106
Private	4	3	60	67
TOTAL	79	18	76	173

These institutions offered about 80 bachelor degree programmes (i.e., three-year degrees, “bacharelato”), 1932 “licenciaturas” and 622 masters in 2005/06 (Table 1.3).

Table 1.3 – Number of degree programmes registered for the academic year 2005/06

Sub-system of Higher Education		Number of degree programmes registered, 2005-2006		
		“Bachalerato”	“Licenciatura”	“Mestrado”
Public Higher Education	University	5	723	528
	Polytechnic	27	619	--
	Sub-total	32	1342	528
Private Higher Education	University	10	308	63
	Polytechnic	38	213	--
	Sub-total	48	521	63
Catholic University	University	--	69	31
	Sub-total		69	31
TOTAL		80	1932	622

Source: DGES

Table 1.4 quantifies the number of new entrants, the total number of students and the number of new graduates for 1995/96, 2004/05 and 2005/06 including graduate and post-graduate degree programmes in public and private institutions. The results show that the number of higher education graduates duplicated over the last decade, with those in the field of science and technology accounting for about 20% of the total number of new graduates, while those in social sciences and management accounted for 29% (in relation to 2003/04). It should be pointed out that the higher education expansion resulted mainly from the increase of the non-university higher education over the 80’s and 90’s, which grew at a rate considerably higher than that of university education, representing, in 2001, nearly 42% of all students. However, it is important to stress that, according to a prospective analysis (Gago 1994), the education level that most contributed to the strengthening of qualification of the Portuguese middle management staff was the undergraduate level.

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New graduates in the field of science and technology represent about 31% of the number of new graduates from the public university system and only 11% of those graduating from the private system, with these relative figures keeping rather constant over the last years. On the other hand, the number of new graduates in the health field increased from 6% to 11% of the total number of graduates from the public system, while they increased from 16% to 20% of the number of graduates from the private system.

Table 1.4 – New entrants, total students and new graduates for different fields of study

a. Overall number of (public and private systems) new entrants, total students and new graduates for different fields of study (graduate and post-graduate degree programmes): 1995/96 to 2005/06

Field of Study	Total Registrations			Registrations 1 st year/1 st time			Graduations		
	1995/96	2004/05	2005/06	1995/96	2004/05	2005/06	1995/96	2003/04	2004/05
Education	30 290	32 928	26 277	8 765	8 293	7 185	6 131	12 166	10 246
Arts & Humanities	28 627	32 658	31 553	6 961	7 738	8 199	4 270	6 037	6 144
Social Sciences, Law	125 499	119 339	116 262	32 133	26 320	25 565	15 361	19 664	19 638
Science & Technology	87 502	111 999	107 430	22 085	20 331	19 098	7 200	14 000	14 696
Agriculture	8 974	7 585	7 045	2 014	1 061	1 024	834	1 331	1 359
Health Sciences	21 708	55 201	58 823	5 516	15 937	16 899	4 101	11 643	13 528
Services	10 835	20 842	20 544	3 629	4 657	4 720	1 319	3 827	4 412
Total	313 435	380 552	367 934	81 103	84 337	82 690	39 216	68 668	70 023

Source: OCES

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b) Total registrations, new entrants and graduations per type of system (public vs. private)

System	Total registrations					New entrants: 1st year, 1st time					Graduations			
	2001/02	2002/03	2003/04	2004/05	2005/06	2001/02	2002/03	2003/04	2004/05	2005/06	2001/02	2002/03	2003/04	2004/05
Public	284789	290532	288309	282273	275961	65921	67640	64801	63365	63700	42200	46499	46854	49220
Private	111812	110299	106754	98664	91973	26915	26806	24468	20998	18990	21898	22012	21814	20803
Total	396601	400831	395063	380552	367934	92836	94446	89269	84363	82690	64098	68511	68668	70023

Source: OCES

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c) Total new entrants and graduations (percentage) in higher education per system and area of study

Field of study	% New entrants: 1st year; 1st time 2004-2005				% Graduations 2003-2004			
	Public Universities	Public Polytechnics	Private	Total	Public Universities	Public Polytechnics	Private	Total
Agriculture	1	2	1	1	3	3	0	2
Arts & Humanities	12	6	7	9	12	6	8	9
Social Sciences & Management	31	26	37	31	25	24	37	29
Science & Technology	32	22	11	24	31	19	11	20
Education	9	9	12	10	16	16	21	18
Health Sciences	9	28	29	19	7	26	19	17
Services	5	7	4	6	6	7	5	6
Total	100	100	100	100	100	100	100	100

Source: OCES

Although the results show there was a large increase in the number of Masters and post-graduate programmes in recent years, the current fraction (i.e., before the implementation of the Bologna process) of post-graduate students and post-graduates remained significantly low in all the institutions, achieving values as high as 20% of the overall number of students in the most research intensive schools in Lisbon and Porto (namely in engineering and sciences), Table 1.5b (see also Table 1.9). It is clear that any international comparison made on the basis of these figures must be carefully assessed, because it reflects the current duration of undergraduate education in Portugal. Although undergraduate education is dominant, it should also be noted that the main challenge in the last few years was based on the tentative generalisation of the research university model in public universities. At the same time, the dichotomy between public and private universities was encouraged, the model of “teaching university” being recognised mainly in private universities and in private and public polytechnics.

Figure 1.10 indicates measures of success (i.e., “survival rate”) in public higher education, using the methodologies referred by OECD (2005), suggesting average values comparable to those reported at international levels.

Figure 1.10 – Survival rates in tertiary-type B education in OECD countries (2000)

a) - Survival rates in tertiary-type A education (mainly Portuguese ‘licenciatura’)

b) Survival rates in tertiary-type B education (Portuguese ‘Bacharelato’)

Note: According to the OECD’s “survival rate index”, which quantifies the number of graduates divided by the number of new entrants in the typical year of entrance).

Source: OCES

Figure 1.11 presents measures of drop-out rates in public higher education, indicating comparatively lower drop-out rates in health sciences, with values increasing for most areas in recent years.

Figure 1.11 – Academic drop-out rates in public higher education for 2002 – 2004

Note: the “drop-out rate” represents the fraction of students enrolled that have left the programme without a diploma, as calculated in percentage of that year’s total enrolments.

Source: OCES

Table 1.5 quantifies the evolution of the number of graduates (undergraduate and post-graduate degrees) from higher education institutions in recent years and, for comparative purposes, Figure 1.12 shows the percentage of engineering graduates in the active population aged between 25 and 64 in several OECD countries throughout the 20th century. This indicator is clearly limited in scope, but confirms a considerable rate of growth since the 80’s, after a remarkable poor performance over most of the 20th century.

Figure 1.12 – Percentage of graduated engineers in active population aged between 25 and 64 years old in a selected group of OECD countries

Sources: Conceição and Heitor (2005). Primary data from: Germany - Bundesanstalt für Arbeit/German Federal Statistics Office/International Labour Organization; USA - U.S. Department of Labor, Department of Labor Statistics, Digest of Education Statistics, 2001, U.S. Education Department/International Labour Organization; BE - Statistics Belgium/ International Labour Organization; Ireland - Central Statistics Office/International Labour Organization; Portugal - Instituto Nacional de Estatística/DAPP/DGES/ International Labour Organization.

Table 1.5 – Evolution of the number of graduates (undergraduate and post-graduate) from public higher education institutions

a. Public Polytechnics: number of graduation degrees awarded (“Bachaleratos” and “licenciaturas”) for 2001/02 – 2003/04

Institutions	2001-2002	2002-2003	2003-2004
TOTAL	17 973	19 843	19 943
INST POLITÉCNICO DE BEJA	818	840	716
INST POLITÉCNICO DO CAVADO E DO AVE	173	228	286
INST POLITÉCNICO DE BRAGANÇA	839	954	978
INST POLITÉCNICO DE CASTELO BRANCO	939	900	880
INST POLITÉCNICO DE COIMBRA	1 613	1 819	1 887
INST POLITÉCNICO DA GUARDA	968	834	784
INST POLITÉCNICO DE LEIRIA	1 238	1 591	1 418
INST POLITÉCNICO DE LISBOA	2 345	2 582	2 589
INST POLITÉCNICO DE PORTALEGRE	655	754	832
INST POLITÉCNICO DO PORTO	2 369	2 547	2 769
INST POLITÉCNICO DE SANTARÉM	824	992	898
INST POLITÉCNICO DE TOMAR	580	594	711
INST POLITÉCNICO DE SETÚBAL	940	1 076	1 032
INST POLITÉCNICO DE VIANA DO CASTELO	756	859	910
INST POLITÉCNICO DE VISEU	1 136	1 310	1 397
ESC SUP DE ENFERMAGEM DE BISSAYA BARRETO	284	343	308
ESC SUP DE ENFERMAGEM DR. ÂNGELO DA FONSECA	155	358	340
ESC SUP DE ENFERMAGEM DE ARTUR RAVARA	166	152	70
ESC SUP DE ENFERMAGEM DE MARIA FERNANDA RESENDE	140	167	142
ESC SUP DE ENFERMAGEM DE FRANCISCO GENTIL	114	95	113
ESC SUP DE ENFERMAGEM DE CALOUSTE GULBENKIAN DE LISBOA	187	157	119
ESC SUP DE ENFERMAGEM CIDADE DO PORTO	157	156	163
ESC SUP DE ENFERMAGEM DE SÃO JOÃO	352	258	296
ESC SUP DE ENFERMAGEM DE D. ANA GUEDES	96	120	97
ESC SUP HOTELARIA E TURISMO DO ESTORIL	129	157	208

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b. Public Universities: number of graduation degrees awarded ("Bacharelatos" and "licenciaturas") and post-graduate diplomas (non-degree specialisations, master degrees, and doctorate degrees) for 2001/02 – 2003/04

Institutions	2001-2002					2002-2003					2003-2004				
	Bacharelatos Licenciaturas Compl Form	Especializ	Mestres (Master)	Doutor (PhD)	TOTAL	Bacharelatos Licenciaturas Compl Form	Especializ	Mestres (Master)	Doutor (PhD)	TOTAL	Bacharelatos Licenciaturas Compl Form	Especializ	Mestres (Master)	Doutor (PhD)	TOTAL
TOTAL	19 675	907	1 865	642	23 089	20 949	1 112	2 382	813	25 256	21 173	1 249	2 534	854	25 810
UNIVERSIDADE DOS AÇORES	504	0	12	0	516	603	29	45	8	685	565	0	43	0	608
UNIVERSIDADE DO ALGARVE	1 735	6	23	15	1 779	1 610	0	70	13	1 693	1 751	57	67	24	1 899
UNIVERSIDADE DE AVEIRO	1 146	0	98	37	1 281	1 295	0	139	44	1 478	1 450	75	152	50	1 727
UNIVERSIDADE DA BEIRA INTERIOR	475	0	35	18	528	480	11	18	19	528	538	42	48	17	645
UNIVERSIDADE DE COIMBRA	2 447	95	169	52	2 763	2 655	72	267	93	3 087	2 437	53	265	69	2 824
UNIVERSIDADE DE ÉVORA	627	14	47	28	716	875	44	54	27	1 000	800	16	73	27	916
UNIVERSIDADE DE LISBOA	2 348	121	225	88	2 782	2 477	194	377	106	3 154	2 473	181	377	123	3 154
UNIVERSIDADE TÉCNICA DE LISBOA	2 208	290	310	142	2 950	2 254	354	348	143	3 099	2 255	362	368	129	3 114
UNIVERSIDADE NOVA DE LISBOA	1 208	118	166	49	1 541	1 326	116	197	93	1 732	1 476	86	183	107	1 852
UNIVERSIDADE DO MINHO	1 938	94	227	64	2 323	2 305	173	243	81	2 802	2 200	153	289	82	2 724
UNIVERSIDADE DO PORTO	2 594	169	450	132	3 345	2 756	117	436	130	3 439	2 908	217	472	150	3 747
UNIVERSIDADE TRAS-OS-MONTES E ALTO DOURO	1 328	0	14	0	1 342	1 232	0	48	24	1 304	1 204	0	54	32	1 290
UNIVERSIDADE DA MADEIRA	475	0	0	1	476	455	0	0	5	460	488	0	11	12	511
INST SUP DE CIÊNCIAS DO TRABALHO E DA EMPRESA	642	0	89	16	747	626	2	140	27	795	628	7	132	32	799

According to the OECD (2005), Portugal has, after Turkey, the lowest share of the population aged 25-64 with at least an upper secondary education level. This share is about 20% for Portugal, while the OECD average is three times larger, at 60%. In the United States it is 76%, in Finland it is 67% and in Ireland it is 50%. In the Czech Republic almost 3/4 of the population aged 25-64 have at least an upper secondary education level.

Table 1.6 – Indicators of the qualification progress of the Portuguese population (%)

	1961	1971	1981	1991	2001
Literacy rate	33	26	19	11	9
Students in higher education/population 18-22 years old	4	7	11	23	53
Population with higher education	0.8	1.6	3.6	6.3	10
Schooling rate at 18 years of age	-	-	30	45	62

Sources: INE, General Population Census; Ministry of Education, GIASE, Education statistics

Table 1.7 summarises the latest available statistical data on the academic qualification of the Portuguese population aged 25-64. The deficit in qualifications, especially at the level of secondary education, was considered by many authors and analysts to be the most serious obstacle to the adoption of organisational structures that would allow greater labour flexibility and adaptation, associated with increasingly competitive markets, and scientific development.

Table 1.7 – Academic qualification 2001 (%)

No academic qualification	11
4 years of schooling	36
6 years of schooling	15
9 years of schooling	13
Upper secondary education (12 years of schooling)	13
Tertiary education	11
Others	1

Source: INE, 2001 Population census

The issues raised in terms of the evolution of supply and demand in higher education should be complemented with the characterisation of the installed capacity, namely in terms of qualified human resources, and Figure 1.13 quantifies the relation student/teachers for various OECD countries. Any extrapolations should be done with caution, because of the diversified methodologies used, namely in the definition of the number of students, with some countries using “full time equivalent”, FTE.

Table 1.8 shows the qualifications of the teaching staff, as registered in December 2004. Teachers with a doctoral degree represent only 55% of the teaching staff in public universities (Figure 1.14), with values ranging from about 35% to 65% across the various public universities. If the total system of higher education is considered, PhD holders represent only 30% of the total number of teachers (Table 1.8).

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Figure 1.13 – Ratio of students to teaching staff in higher education in OECD (2003)

Notes: Teaching staff is based on full-time equivalents, FTEs; Norwegian and Portuguese data refer to public institutions only;

Sources: Portuguese data from DGESUP and OCES; otherwise: OECD (2005), Education at a Glance.

Table 1.8 – Teaching staff involved in tertiary education in Portugal (Head counts, as by December 2004)

		Academic qualifications				
		PhD	Master	"Licenciatura"	Other	Total
PUBLIC UNIVERSITIES	Number of teachers	8029	3499	2779	239	14546
	%	55,2	24,1	19,1	1,6	
PUBLIC POLYTECHNICS	Number of teachers	1002	4033	4664	528	10227
	%	9,8	39,4	45,6	5,2	
PUBLIC MILITARY SYSTEM	Number of teachers	114	131	323	21	589
	%	19,4	22,2	54,8	3,6	
PRIVATE UNIVERSITIES	Number of teachers	1177	1372	1688	53	4290
	%	27,4	32,0	39,3	1,2	
OTHERS PRIVATE	Number of teachers	994	2236	3707	213	7150
	%	13,9	31,3	51,8	3,0	
Total	Number of teachers	11316	11271	13161	1054	36802
	%	30,7	30,6	35,8	2,9	

Source: OCES-MCTES

Figure 1.14 – Characterisation of public university faculty in terms of qualifications, 2004

Source: OCES, Development of Teaching Staff Qualifications in Public Higher Education: from 1993 to 2003, OCES, August 2004

Figure 1.15 quantifies the number of PhDs granted by Portuguese Universities, revealing an increasing capability to offer PhD programmes, although the relative figures are still considerably low when compared internationally. For example, Table 1.9 shows that, in Portugal, a new PhD is awarded for 51 new graduates (as measured four years before), while the corresponding number for Spain is 30, and 9 and 7 for Holland and Germany, respectively. This comparison is important as it reveals the considerably small dimension of post-graduate education in Portugal, justifying the need to strengthen the research environments in universities. Beyond the need to reinforce post-graduate education, this issue also raises the need to build up internationalisation.

Figure 1.15 – PhDs concluded in Portugal, or abroad and recognised by Portuguese universities, in the period 1970-2002

Source: Science and Higher Education Observatory, PhDs concluded or recognised by Portuguese Universities, April 2003; Official Journal (II Series): Semester break down of PhD diplomas obtained abroad and recognised in Portugal under Decree-Law 216/97, of 18 August; Director-general for Higher Education: Registry of PhDs obtained in the European University Institute of Florence under Decree-Law 93/96, of 16 July.

The continuous increase in the number of doctorates, especially when considering European and international figures, was systematically referred to by the generality of the evaluation panels that visited Portugal since 1996 in the context of international evaluations of R&D Centres as a decisive factor to guarantee the critical mass essential for scientific development (Heitor, 2000). It is also important to note that in 2001 Portugal was, for the first time in history, part of the group of the countries of excellence that contributed to the share of top 1% of the world's highly cited publications (King, D.A. 2004). This is important because the number of citations by scientific paper are the best quality and impact measure of research produced by an individual, a group or, in this case, a country. Between 1997 and 2001, Portuguese researchers contributed with 96 publications to this restricted group, accounting for 0.25% of the overall figure. Naturally, the United States were in the leading position with 63% of the overall number of publications, followed by the UK with 13%. Spain was responsible for 2.08%, whereas Ireland and Greece accounted for 0.36% and 0.3%, respectively. Not only was the Portuguese presence relevant, but it also has significantly increased in the second half of the nineties (Figure 1.15). In fact, between 1993 and 1997, Portugal had contributed 0.12%, less than half of the contribution for the most recent period. It is worth mentioning that between 1991 and 2001, the total funding for R&D activities grew from 0.4% to 0.79% of the GDP, and that the annual flux of new PhD holders was nearly three times higher.

Table 1.9 – Relation between the annual flux of new graduates and doctorates

a) Average number of new graduates per each new PhD awarded in several countries

Country	Source of information	Number of new PhD's/Year (Latest Available year, Y)	Number of new graduates/Year (4 years before Y)	New Graduates per each new PhD
Portugal	OCES	1 068	54 255	51
Norway	Norway Statistics and NIFU STEP	855	29 376	34
Spain	Instituto Nacional de Estadística	6 936	208 543	30
United Kingdom	Higher Education Statistics Agency	10 660	233 610	22
Holland	Statistics Netherlands	2 556	23 954	9
Germany	Federal Statistical Office	23 138	159 115	7

b) Number of new graduates per each new PhD awarded in Portugal for various scientific areas

Scientific Area	New graduates in 1998 per each new PhD in 2002	New graduates in 1999 per each new PhD in 2003	New graduates in 2000 per each new PhD in 2004
Agriculture	22	30	30
Arts & Humanities	234	473	404
Social Sciences, Economics, Management & Law	69	67	58
Education	155	169	166
Sciences & Engineering	18	18	18
Health and Social Protection	58	76	91

Source: OCES

Figure 1.16 – Evolution of the number of scientific publications by Portuguese institutions, as registered by the ISI, in the period 1980-2003

Source: ISI, OCES

The facts show the significant development of the national scientific community in the international context, but it should be clear that the European integration process and the subsequent growth of the S&T system, especially in the second half of the nineties, cannot explain the maturity of the Portuguese system, namely when it is analysed in international terms. The late development in S&T that characterised Portugal, in comparison with its European counterparts, was due to the close relationship between scientific development and freedom of thought, that had been severely encumbered by the dictatorship (i.e., “Estado Novo”) until the mid-seventies. It is recognised that the expenditure on Portuguese R&D, comparatively to other OECD countries has always been small, resulting from a slow and late development of its R&D system, associated with few funding programmes and discontinued policies, which delayed the increase in R&D activities in Portugal.

The need to strengthen the science and technology system and to increase doctorate-level training was associated with the overall research context and Figure 1.17 quantifies the evolution of the number of researchers in Portugal and Europe as a function of the workforce. Scale has been a major challenge for Portugal, where for each 1,000 workers there are only about 3.6 researchers, compared with 5.4 in EU-25 and 8 in the US.

Figure 1.17 – Evolution of the number of researchers (FTE, full time equivalent) in terms of the workforce for Portugal and Europe, in the period 1980-2003

Source: OCES

It should be noted that about 50% of the overall number of researchers (FTE; full time equivalent) work at higher education institutions and related R&D centres (Table 1.10), in a way that is very much specific of Portugal. In addition, 14% of the total number of researchers works at private, non-profit institutions, which are closely linked to higher education centres. These two groups represented in 2003 about 64% of the Portuguese researchers (FTE).

Table 1.10 – Distribution of researchers per type of institution in Portugal, 2001, 2003

Personnel	Execution Sectors									
	Companies		Government		Higher Education		Private, non-profit		Total	
	2001	2003	2001	2003	2001	2003	2001	2003	2001	2003
Researchers										
Head counting	4 625	6 102	5 211	5 027	17 276	19 906	4 034	4 820	31 146	35 855
FTE	2	3 793,9	3 646,4	3 439,6	8 941,6	10 062,4	2 415,2	2 946,1	17 725,1	20 242,0
% FTE/ Head counts	15	21	21	19	50	57	14	17	100	100
Researchers (FTE)/Workforce (‰)	0,5	0,7	0,7	0,6	1,7	1,9	0,5	0,5	3,3	3,7
Total I&D personnel										
Head counting	6 821	9 882	8 478	7 273	19 112	21 488	4 752	5 393	39 163	44 036
FTE	3	6 123,7	5 971,4	4 917,0	10 173,6	11 146,0	2 951,2	3 341,9	22 071,1	25 529,4
% FTE/ Head counts	17	27	26	21	44	49	13	15	100	100
Total personnel (FTE)/Workforce (‰)	0,7	1,1	1,1	0,9	1,9	2,1	0,6	0,6	4,3	4,7

Source, OCES, IPCTN 2003

Beyond scale in science and technology, Table 1.11 refers to intensity figures and shows that the total funding available per researcher in Portugal in 2001 was only 1/3 of the European average (considering the new EU-25), while the average funding available for a university researcher in Europe was half of that for an American university researcher. Also, the gross expenditure in R&D per inhabitant in Portugal in 2001

was about 22% of the average value for EU-15, 26% for EU-25 and only 64% of the value for Spain. For comparison, the gross domestic product per capita for Portugal was in 2001 only about 75% of the average European value, confirming a considerably low investment in R&D for Portugal.

Table 1.11 – Expenditure in R&D per researcher (1000 €/ FTE) and per inhabitant, 2001

	Expenditure in R&D per Researcher				Gross expenditure in R&D per inhabitant
	Gross expenditure	Business sector	Higher Education	Government	
	1000 € / FTE				
Poland	23	49	12	39	34
Hungary	37	54	24	30	53
Greece	54	101	38	86	73
Czech Rep.	55	87	31	41	80
Portugal	58	121	41	59	99
Turkey	60	125	50	35	-
Spain	78	172	41	74	155
Finland	125	156	76	103	890
Ireland	139	151	111	130	309
UK	145	164	92	214	382
Belgian	153	201	90	127	450
Norway	154	165	137	144	675
UE-25	156	214	90	147	375
UE-15	171	225	103	170	442
France	180	239	94	205	525
Austria	180	183	168	228	420
USA	182	169	171	361	845
Holland	186	223	145	170	490
Denmark	188	254	121	132	666
Italy	188	239	150	165	215
Germany	199	236	121	186	628
Japan	212	245	103	404	1 133
Sweden	227	291	128	132	1 175
Switzerland	266	312	171	222	951

Sources: Conceição and Heitor, (2005); OECD (2004); Eurostat; <http://europa.eu.int/comm/eurostat/>

Notes: data on “PPS”, for 2001 or last year available (Austria, United Kingdom: 1998; Belgium, Denmark, Greece, USA: 1999; France, Ireland, Italy, Netherlands, UE-15, UE-25, Turkey, Switzerland: 2000); “FTE” refers to “full time equivalent”

2. The country at large

Portugal has a population of 10.4 million inhabitants (112.4 inhabitants/km²) and social indicators show steady progress in the last two decades (Table 1.12). The country is formed by three territorial areas: mainland (88 889 km²) and the archipelagos of the Azores (2 355 km²; nine islands) and Madeira (741 km²; two main islands).

Table 1.12 – Social indicators

	1980	1990	2002
Mean life expectancy	71.5	74.1	77.3
Infant mortality (deceased/1000 births)	21.8	21.8	5.0
Medical doctors/100 000 inhabitants	196.9	196.9	324.0
Women average at first birth	23.6	24.7	27
Higher education enrolments	106 316*	187 193	400 831
Schooling rate – upper secondary	-	8.4%	13.0%
Schooling rate – higher education	-	6.6%	11.4%
Families with computers (%)	-	11**	28
Mobile phone subscribers	-	340 845**	8 530 410

* 1985 ** 1995

Source: The Ministry of Finances, The Portuguese Economy, Lisbon, July 2005

A long period of consistently declining birth rates associated to increasing life expectancy resulted in an ageing population (Table 1.13) and had a negative effect on student enrolment.

Table 1.13 – Population forecasts, Portugal

Ages	2000	2005	2010	2015	2020
0-4	534 286	554 738	522 843	484 303	446 623
5-9	532 394	550 703	558 604	524 290	485 886
10-14	573 995	548 906	555 003	560 471	526 237
15-19	682 010	599 837	555 763	558 865	564 391
20-24	783 305	721 495	610 807	561 357	564 596
25-29	806 880	821 305	731 002	614 891	565 785
30-34	754 144	837 913	827 765	732 825	617 507
35-39	763 331	778 298	841 519	827 097	732 966
40-44	721 530	777 749	778 315	837 926	823 878
45-49	679 543	727 562	773 422	772 191	831 660
50-54	636 353	678 434	718 900	763 155	762 691
55-59	565 965	629 529	664 695	703 914	748 239
60-64	545 635	552 795	608 967	642 918	682 286
65-69	533 000	517 321	523 242	577 425	611 654
70-74	449 620	483 070	470 957	479 771	532 401
75-79	344 734	377 783	410 450	404 530	417 368
80-84	199 783	256 904	288 368	319 940	321 398
85+	150 150	147 489	185 443	220 817	253 586
Total	10 256 658	10 561 829	10 626 062	10 586 682	10 489 152

Source: INE, 2005

The total Portuguese active population was 5 475 800 (2 954 100 men and 2 521 700 women) in 2004, with an activity rate equal to 52.2% (58.1% for men and 46.6% for women), and a low schooling level, as quantified in Table 1.14.

Table 1.14 – Active population (%) by age group and qualification level

Age range	Year	None	Basic 1 st cycle ^a	Basic 2 nd cycle ^b	Basic 3 rd cycle ^c	Upper secondary ^d	Higher education
16-64	1998	10.1	34.6	19.2	16.7	12.4	7.1
	2004 ^e	5.7	29.3	19.3	19.3	15.6	10.8
15-24	1998	2.2	7.5	29.2	36.2	22.2	2.8
	2004 ^e	1.0	3.5	20.7	42.5	28.4	3.9
24-44	1998	4.7	33.1	24.4	13.8	13.7	10.2
	2004 ^e	3.2	20.0	26.7	16.9	17.4	15.7
45-64	1998	21.9	54.2	6.2	7.4	4.4	6.0
	2004 ^e	11.2	54.7	9.2	10.2	6.4	8.3

Notes: a - 4 years of schooling b - 6 years c - 9 years d - 12 years e - First three trimesters

Source: INE, "Inquérito ao Emprego"

The Portuguese GDP (current prices) is 135 078 million euros (2004) and the *per capita* GNP (ppp) is 16 370 euros (2004), Tables 1.15 and 1.16.

Table 1.15 – Economic indicators, Portugal

	Real GDP		Work Productivity (ppp; EU = 100)	Inflation rate (%)
	Rate of change %	Difference to EU ppp		
2002	0.4	-0.6	62.4	3.6
2003	-1.1	-2.0	59.8	3.3
2004	1.0	-1.4	59.0	2.4
2005 ^a	0.8	-1.2	58.4	2.7

Notes: a – estimate, Ministry of Finances, Programa de Estabilidade e Crescimento 2005-9, July 2005

Sources: INE, Eurostat, European Commission, Bank of Portugal, Ministry of Finances

Table 1.16 – Per capita GDP

	Per capita GDP, current prices		Per capita GDP, current prices (in ppp)	
	EUR	UE15 = 100	EUR	UE15 = 100
1998	9 907	48.7	13 922	68.5
1999	10 620	49.8	14 979	70.2
2000	11 300	49.9	15 953	70.4
2001	11 931	51.1	16 481	70.6
2002	12 495	51.9	17 048	70.9
2003	12 536	51.6	16 727	68.8

ppp – purchasing power parity

Source: European Commission, AMECO data base, April 2004;

The evolution of the overall economic situation has negatively reflected upon the unemployment rate (Table 1.17) and some traditional sectors, such as the textile and shoe industries, have been badly hit by competition from emerging economies. As it has been recognised in various OECD documents, the population's lack of qualifications is one of the factors that most contributes to the low Portuguese productivity in comparison with other OECD countries.

Table 1.17 – Labour market indicators

	2003	2004	2005
Homologous change rates (%)			
Salaries implicit in collective	2.9	2.9	2.7
Work cost index ¹	3.0	1.6	3.5
Total employment	-0.4	0.1	-0.3
Unemployment rate (%) ²	6.3	6.7	7.5
Activity rate (15-64 years) (%) ³	72.8	72.9	73.1

1 – Without the Public Administration;

2 – Unemployed population/Active population;

3 – Active population (15-64 years)/Total population (15-64 years)

Sources: INE, Ministry of Work and Social Security and Ministry of Finances

The Portuguese population is ageing. As a direct consequence of low birth rates combined with increasing life expectancy, the number of elderly people has been steadily increasing while the number of young people has been consistently decreasing. During the 1990s, the population of Continental Portugal lost 390 000 people of the “normal” age cohort expected to enrol in basic and in upper secondary education. Population forecasts made by the National Institute of Statistics (INE) for 2006 show that the situation will not significantly change in the near future, Table 1.18³. So far the effects of immigration have not compensated this phenomenon.

Table 1.18 shows that, for 2006, the number of students in the second cycle of basic education (10-11 years), or in the third cycle (12-14 years) and in upper secondary education (15-17 years) was lower than in 2001 by up to 12%. There was a slight increase relative to 2001 only for the age group 6-9 years (first cycle of basic education).

Table 1.18 – Population by age groups (mainland Portugal)

Age interval	1991 (1)	2001 (2)	□□□□□	□ (%)	2006* (3)	□□□□□	□ (%)
6 – 9	494 495	406 428	-88 067	-18	410 199	+3 771	+1
10 - 11	277 757	213 368	-64 389	-23	199 680	-13 688	-6
12 - 14	457 871	330 128	-127 743	-28	315 292	-14 836	-4
15 - 17	484 535	372 523	-112 012	-23	328 660	-43 863	-12
Total: 6 – 17	1 714 658	1 322 447	-392 211	-23	1 253	-68 616	-5

* estimates

Sources: XIII and XIV Population census, INE

³

The 2006 estimate includes both the resident population (by age intervals, data from 2001) and the migratory flows. It was assumed that all the individuals below 12 years of age have survived until 2006, as mortality is very low at this age, and that migration flows, which in the 1990s have resulted in a net population increase of 405,000 people, will continue at the same rate over the next lustrum, originating an additional increase of 202,500 people and were divided following a specified age structure).

The importance of the population decrease is not the same for all age groups, due to changes in the birth rates. Until 1995 there was a consistent decline in the number of births (although this decline was very low between 1990 and 1993), followed by a five year period (1996 to 2000) of increase in the annual number of births. This explains that the most significant population decrease from 2001 to 2006 occurred for the population older than 15 years. The ageing of the population also explains the illiteracy rate's slow decrease, which has only fallen from 11% to 9% between 1991 and 2001. Indeed, it is among individuals older than 65 years that the illiteracy percentage is highest (Table 1.19), while among the younger age groups the illiteracy rate is negligible. In 1991 the number of people aged 15 years or less was 1.5 times higher than those aged 65 years and more. However, in 2001 this relation was reversed, with the number of older people surpassing the number of younger people.

Table 1.19 – People (%) without any schooling, by age groups (Portugal) – 2001

	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
Total	1.0	1.4	1.5	1.8	2.3	2.9	6.0	18.7	25.8	31.2	42.2
Men	1.1	1.5	1.7	1.9	2.1	2.5	4.3	13.1	18.8	23.4	31.5
Women	0.9	1.2	1.4	1.8	2.4	3.4	7.6	23.5	31.6	37.2	48.7

Source: XIV Population census, INE

The highest proportion of illiterate people is observed for women, mainly above 60 years old. For people aged over 75 years, almost half of the women are illiterate against a third of the men.

3. The duality of the Portuguese society

It is important to note that the deficiency in the level of qualifications in the Portuguese population is not due to differences in levels of achievement in university or tertiary education. In fact, while the share of the Portuguese population with university education is low (about 9%), it is only about half of the OECD average, and is comparable to that of countries such as Italy and Austria. This reveals a duality of Portuguese society that looking at average and aggregate numbers may obscure (Conceição and Heitor 2005).

Figure 1.18 shows that, for the entire population, Portugal exhibits one of the lowest scores in average literacy, as measured by OECD. But the low literacy levels do not seem to be dramatically punished by the economy, as Portugal has one of the highest levels of labour participation for people with the lowest level of literacy (Figure 1.19). This is partially explained by the overall high rate of labour participation in Portugal (note the high figure for the United States and Switzerland as well), but the low unemployment rate is not the only explanation (compare with the Netherlands and Ireland). Part of the reason may be associated with the demands of large sectors of the economy, which so far have not required advanced skills, or even literacy.

Figure 1.18 – Average Literacy Survey Results in OECD Countries⁴

Figure 1.19 – Labour Force Participation of the Population Segment with the Lowest Level of Literacy in OECD Countries⁴

The duality of the Portuguese society clearly emerges after dividing the overall population into finer segments. As an example, consider only young people that are relatively educated (20 to 25 years of age

⁴ Primary data obtained from OECD (2002). See Conceição and Heitor (2005), for details and related analysis.

with upper secondary education). For this segment of the population, Portugal ranks on a par with the Netherlands, Germany and Norway, Figure 1.20.

Figure 1.20 – Literacy Scores of People Aged 20-25 Years and with Upper Secondary Education in OECD Countries⁵

Figure 1.21 compares the share of university degrees in various OECD countries (2003), illustrating the relative weakness of the Portuguese society in terms of technical qualifications (considering both engineering and natural sciences), which to a large extent can be explained by the high school retention rates in these areas of study. Comparable 1st year enrolments reached 25% (against 19% of degrees), which was approximately Switzerland's position, and quite close to the European average. But looking at Portugal in an international context does require considering both absolute and relative figures, so that the scale and intensity are taken into account over time.

⁵

see footnote 4.

Figure 1.21 – National shares of university degrees among different fields (2003)

Source: National Science Foundation.

Duality is also present when one looks at science and technology indicators. Figure 1.22 shows both the scale and the intensity of national expenditures on R&D for several OECD countries, with the horizontal axis, representing the scale of the expenditure, on a logarithmic scale. The relationship between scale and intensity shows decreasing returns: as the scale of the investment grows, the increase in intensity also grows but at a decreasing (in fact, logarithmic) rate. The results also suggest that there are three different “paths” in which this relationship is expressed. The thick line in Figure 1.22 represents a simple fitting of the position of most countries. Nordic countries have a path of their own, with a much higher responsive intensity to increases in scale. Portugal is shown in the lower left-hand corner of the figure, part of a line that includes other Southern European countries.

The duality is manifest when one looks not at static comparisons of levels, but at dynamic comparisons of rates of change. Portugal shows one of the largest increases on R&D gross domestic expenditure of all OECD countries from 1995 to 2000. During this five-year period, R&D expenditure grew at an annual rate of 10% in Portugal, while in the European Union as a whole it grew at a 3% annual rate. This growth represented a recovery from the slowdown of 1991-1995, when the Portuguese R&D expenditure grew only 3.8%, while from 1985 to 1990 it grew 14%.

Figure 1.22 – Intensity and Scale of R&D Expenditure in the OECD

Source: OECD, 2003

The same duality is present if one looks at other features. For example, Portugal has one of the lowest shares of new science and technology PhDs per thousand of population aged 25-34 years (only 0.23%, compared with 0.55% in the European Union; figures are for 2000). However, it has, by far, the largest growth rate: 12% growth from 1998 to 1999, compared with no growth at all at the European Union level. In terms of publications, Portugal, in 1999, had 248 scientific publications per million of population, and in 2003 it had 406 (Figure 1.16). The average annual growth rate from 1995 to 2000 was almost 16%, while for Greece (the second ranking country) it was 7%, and in the EU it was below 3%.

The duality argument should not be read as meaning that Portugal is free from structural weaknesses. In fact, even in the age segments that exhibit better education performance structural weaknesses remain. For example, in basic education retention rates are still one order of magnitude higher than the European average. Portugal also exhibits the highest rates of school leavers from the 10th to the 12th year of schooling (Table 1.20). And in the active population (with ages between 20 and 34) Portugal still manifests deficit in qualifications.

Table 1.20 – Early leaves (%) from secondary school (2005) in European Countries

	UE15	B	DK	D*	EL	E	F	IRL	I	L	NL	A	PT	FIN	S	UK
Total	17	13	9	12	13	31 ^b	13	12 ^p	22	13 ^p	14	9	39	9 ^p	9 ^p	14 ^p
Female	15	11	8	12	9	25 ^b	11	10 ^p	18	13 ^p	11	9	30	7 ^p	8 ^p	13 ^p
Male	19	15	9	12	18	36 ^b	15	15 ^p	26	13 ^p	16	10	47	11 ^p	9 ^p	15 ^p

Notes: b – break in series p – provisional value

Source: EUROSTAT (<http://europa.eu.int/comm/eurostat>).

To conclude, there is a wide diversity of performance across the Portuguese society and economy. Averages are low, but they may be misleading, since there is large dispersion across cohorts. Portugal can be characterised as exhibiting a dual nature, with high levels of performance co-existing with low levels. This, however, does not mean that it is enough to hope for the best-performing cohorts to “take over” the low-performing ones, since structural weaknesses remain and may affect even the best performing sectors.

4. The education system: from basic to higher education

Figure 1.23 presents a schematic diagram of the Portuguese educational system, as by January 2006, which includes the following components:

- Pre-school education (i.e., "educação pré-escolar") complements and/or supplements the role the family plays in early learning for children aged 3 to 6. Attendance is optional.
- Basic education (i.e., "ensino básico") lasts 9 years and begins at 6 years of age. The education programme at this level aims to provide all individuals with general and common education, enabling them to continue to higher levels of education or to join programmes geared to working life. Basic education involves three successive cycles: 1st cycle of 4 years, 2nd cycle of 2 years, and a 3rd cycle of 3 years. There is also a system of basic education for adults (i.e., "ensino básico recorrente") that provides a second opportunity to those who failed to complete their education at the usual age, or who dropped out of school early, or to those seeking cultural or professional improvement.
- Secondary education in Portugal (i.e., "ensino secundário") corresponds to what in Europe is currently called "Upper Secondary Education". It is structured in different ways to provide general programmes (i.e., "cursos gerais"), aimed at those wishing to continue to higher education, and other programmes aimed at those seeking to enter the labour market. Students may change from one programme to another. Each of these programmes lasts three years, corresponding to the 10th, 11th and 12th grades of school.

Figure 1.23 – Diagrammatic representation of the Portuguese education system, as by January 2006, before the implementation of the Bologna Process

Source: Estia, 2003, <http://www.des.min-edu.pt/estia/edu/diagindex.html>

Technological programmes represent only 22% of regular upper secondary education, which contrasts with the situation in most European countries where vocational-type education represents in general more than 50% of the number of students.

Table 1.21 – Number of students enrolled in secondary education in 2005/06

	Total	Public	Private
General	175 154	158 290	16 864
Technological	49 800	44 114	5 686
Specialised artistic	2 063	1 948	115
Professional	33 341	3 607	29 734
Qualifying	3 103	2 411	692
Recurrent	61 660	54 277	7 383
Total	325 121	264 647	60 474

Source: Ministry of Education, 2006

“Professional education” (Table 1.21) is usually considered in a perspective of lifelong education and provides students with a diploma of upper secondary education and a professional qualification at ISCED level 3 (also level 2 for a few cases). Students can continue studies by enrolling in “Technological Specialisation Programmes” (i.e., CET) to obtain an ISCED level 4 qualification and later can continue to higher education, preferably in a polytechnic. Most of the students enter the labour market after completing their studies due to the high employment rate of these courses.

“Qualifying education” (Table 1.21) aims at people having completed basic education, aged less than 22 years when they start the programme, and requiring to enter the labour market by obtaining a professional qualification at ISCED level 3 and an upper secondary school diploma.

“Recurrent education” (Table 1.20) addresses adult education and aims at offering a second opportunity to adult students or to young people already integrated in the labour market. It is based on credit accumulation.

“Specialised art education”, (Table 1.21) is aimed to provide different types of art training, at a secondary level, associated to social demand exclusively directed at deepening certain artistic languages independently of a vocational option. In the reform of specialised art education, rules were laid down for the creation of specialised art programmes directed, depending on the art area, at pursuing higher education studies or at the dual perspective of integration in the labour market, with the issuance of a level 3 vocational qualification certificates, and the pursuance of higher education studies.

Post-secondary education was recently reinforced with a new legal framework expanding “Technological Specialisation Programmes” (i.e., “CETs – Cursos de Especialização Tecnológica”), which aim at conferring students a diploma of technological specialisation and a level IV professional qualification. These programmes are offered mainly to students that completed upper secondary education or that have qualifications equivalent to a level 3 professional qualification, and come under the supervision of one of four ministries: Education, Economy, Work and Social Solidarity, and Science, Technology and Higher Education.

As already described, higher education comprises university and polytechnic education, public and private, both with different aims, programmes and characteristics. It should be noted that the structure of Figure 1.23 will change with the implementation of the Bologna process. The framework legislation was just approved and published (March 2006) being under implementation.

Until 2002 the Ministry of Education had responsibility for education at all levels (pre-school education, basic education, upper secondary education and higher education). Since then, two different ministries share this responsibility: the Ministry of Education is responsible for all pre-higher education levels and the Ministry for Science, Technology and Higher Education is responsible for higher education and research. The Ministry for Work and Social Solidarity plays a significant role in professional training and in the certification of professional competences.

Educational reforms are generally based on government initiatives resulting in decree-laws, or leading to laws to be passed by Parliament, including a systematic consultation process involving all major stakeholders. In general all proposals for new legislation are discussed by the National Education Council and require consultation of the appropriate relevant bodies (such as CRUP, CCISP, APESP, professional unions and student associations, in the case of higher education). In addition, the Parliament often organises auditions with experts and stakeholders to debate new reforms. The President of the Republic oversees the Constitutional conformity of the legislation and may ask for the opinion of the Constitutional Court before promulgating any new legal diploma. Employers’ organisations are in general conspicuously absent from the policy processes of the Portuguese higher education system. Paradoxically, at a time when

there is a more market-friendly rhetoric and concern about the articulation of higher education and economic activity, Portuguese employers and their organisations are far from taking on the status of effective political actors involved in setting up higher education policies. However, it should be noted that major reforms have been extensively debated in the appropriate bodies and, in a number of cases, public enquires and debates have been organised.

5. The levels and perspectives for student enrolments

Pre-primary education was assumed as an important tool to address social inequalities, which explains governmental efforts to increase its attendance over the last years (Tables 1.22 and 1.23).

Table 1.22 – Pre-schooling attainment rate (%)

1985/86	1990/91	1995/96	2003/04
30	51	58	77

Source: Ministry of Education, GIASE, Education Statistics.

Table 1.23 – Age distribution of pre-school enrolments, 2003-04

	3 years	4 years	5 years	≥ 6 years	Total
North	15 155	22 685	25 106	378	63 324
Centre	11 249	14 277	14 669	410	40 605
Lisbon	9 955	14 432	14 330	346	39 063
Alentejo	2 990	3 867	4 030	215	11 102
Algarve	1 437	2 390	2 363	77	6 267
Azores	917	1 804	2 828	387	5 936
Madeira	1 748	2 534	3 121	158	7 561
Total	43 451	61 989	66 447	1 971	173 858

Source: Ministry of Education, GIASE, Education Statistics.

In mainland Portugal the number of students enrolled in basic education has fallen by about 17.6% over the 1990s, which is explained by demographic changes. Table 1.24 shows that this decreasing trend continued in more recent years, with an additional 4% decrease in enrolments from 1999/2000 to 2003/04. One may also notice that since the early 1990s, basic education, which is compulsory, lost around 21% of its students.

Despite the decrease in enrolments, one observes an increase in the number of those completing basic education. For instance, in 1991, 35% of the population aged 15-19 years had at least completed basic education, a percentage that has almost duplicated by 2001 to 67%.

Table 1.24 – Enrolments and attainment rate for basic (compulsory) education

	1st cycle		2nd cycle		3rd cycle		Total	Attainment Rate (%)
	Public	Private	Public	Private	Public	Private		
1990/91	616 410	53 115	330 377	26 043	419 629	38 682	1 484 256	x
1991/92	605 606	52 699	327 240	27 391	451 023	45 223	1 509 182	x
1992/93	567 199	46 498	311 729	27 515	443 922	45 026	1 441 889	x
1993/94	541 387	44 647	315 183	28 254	457 985	42 368	1 429 824	x
1994/95	532 913	47 570	296 332	25 160	464 661	41 813	1 408 449	123.8%
1995/96	505 514	47 210	289 482	25 727	429 818	41 998	1 339 749	121.2%
1996/97	492 089	46 033	277 154	27 233	419 062	44 152	1 305 723	121.1%
1997/98	489 700	45 412	258 257	26 831	413 851	42 325	1 276 376	121.0%
1998/99	489 193	49 080	253 517	27 584	398 094	42 005	1 259 473	121.7%
1999/00	489 049	50 894	248 364	28 165	382 288	42 076	1 240 836	122.1%
2000/01	483 329	52 251	243 735	28 058	372 837	42 941	1 223 151	122.1%
2001/02	468 241	51 970	241 637	29 188	358 987	42 908	1 192 931	120.0%
2002/03	458 684	49 788	243 246	30 923	347 423	44 348	1 174 412	118.5%
2003/04*	412 349	46 014	223 757	28 995	318 025	42 811	1 071 951	x

Notes: Data for 2003/2004 are preliminary.

Source: Ministry of Education, Office for Information and Evaluation of the Educational System (data for 1990-2003).

The Portuguese participation rates in upper secondary education are still far from the average European levels. Total enrolment in upper secondary education – an education level that is not yet compulsory in Portugal – increased until the mid-1990s, and then decreased as consequence of declining birth rates. The increase took place in spite the fact that the population at the “normal” attendance age (15-17 years) decreased 23% over the 1990s (less 117,000 people), which can be explained by the wider age range of students attending upper secondary education.

Notwithstanding the improvement of the overall situation, there are still some factors that negatively influence the students’ career in this phase of schooling. Over the last few years thousands of students completed 16 years of compulsory education without completing basic schooling (9 years). There were also a large number of students under 24 years old enrolled in upper secondary education but who left the education system without graduating (Table 1.26).

Table 1.25 – Upper secondary education – enrolments

Year	Public	Private	Total
1990/91	318 239	29 672	347 911
1991/92	360 924	40 339	401 263
1992/93	367 083	48 778	415 861
1993/94	385 348	52 952	438 300
1994/95	400 102	57 092	457 194
1995/96	416 309	60 912	477 221
1996/97	398 166	60 066	458 232
1997/98	382 261	60 522	442 783
1998/99	362 143	58 862	421 005
1999/00	354 832	62 873	417 705
2000/01	344 135	69 613	413 748
2001/02	326 045	71 487	397 532
2002/03	316 848	68 741	385 589
2003/04*	283 678	62 314	345 992

* Only for the mainland

Source: Ministry of Education, GIASE, 2005

Table 1.26 – Population aged 18-24 years, not enrolled in education, 1991-2001.

	1991		2001	
	n	%	n	%
Total population, 18-24 years	1 097 208	100	1 083 320	100
Without completing the 3 rd cycle of basic education	594 004	54	266 052	25
Without completing upper secondary education	104 560	10	219 155	20
Total, < upper secondary education	698 564	64	485 207	45

Source: INE, General Population Census, 1991 and 2001

Each year a significant number of students with low education level will enter segments of the labour market that employ workers with low qualifications. These young people will most likely not return to the education system to complete secondary school. One of the possible reasons for the lack of attractiveness of secondary education is the predominantly academic character of this education level. Indeed, most of the upper secondary education provision aims at providing a route to enter higher education, with only less than 30% having technological or vocational emphasis.

Table 1.27 shows that in 2001 the drop-out rate (abandonment rate)⁶ in basic education was no longer significant, but anticipated leaves⁷ and early leaves⁸ were still a major problem. Furthermore, persistently high retention rates in upper secondary education continued to be around 35% since 1995 (Table 1.28).

⁶ Drop-out rate (%) – students in the compulsory education age (6-15 years) leaving the education system without completing compulsory education (9 years) for every 100 people in that age range.

Table 1.27 – Abandonment rates, anticipated leaves and early leaves (%)

	1991	2001
Abandonment rates	13	3
Anticipated leaves	54	25
Early leaves	64	45

Source: INE, General Population Census, 1991 and 2001

Table 1.28 – Evolution of retention rates and drop-outs

	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03
Basic education	13.8	15.2	13.8	13.2	12.6	12.7	13.6	13.0
Upper secondary	33.1	35.7	35.6	36.0	36.8	39.4	37.4	33.7

Source: Ministry of Education, GIASE, Education Statistics

The highest percentage of retention and drop-out occurs in the first year of every cycle and it is especially significant in the 10th grade, which marks the transition from basic education to upper secondary education.

The present government's recent initiative of the "New Opportunity Programme" includes a set of actions aiming at improving the qualification of the Portuguese population and developing lifelong learning. These objectives are an integral component of the national effort under the EU Lisbon Strategy and consider the following goals:

- Increase the offer of vocational education in upper secondary education to enrol an additional number of 100,000 students. By 2010 vocational education should represent 50% of the total offer of upper secondary education, the other 50% corresponding to general education leading directly to higher education.

Table 1.29 – Estimated increase of vocational education in upper secondary education

	2005	2006	2007	2008	2009	2010
Additional vacancies		+ 5 000	+5 000	+10 000	+10 000	+5 000
Accumulated new		+5 000	+10 000	+20 000	+30 000	+35 000
Total yearly vacancies	110 000	115 000	120 000	130 000	140 000	145 000

Source: Ministry of Education and Ministry of Work and Social Solidarity, Programme New Opportunities

- Offer a new opportunity to students that would leave the education system before completing basic education. Until 2010 there will be an adequate number of vacancies in vocational programme offering an alternative route for the completion of basic education.

⁷ Anticipated leave (%) – students in the age range 18-24 years that have left the education system without completing compulsory education for every 100 people in that age range.

⁸ Early leaves (%) – students in the age range 18-24 years that have left the education system without completing upper secondary education (12 years) for every 100 people in that age range.

Table 1.30 – Estimated increase in the supply of vocational education in basic education

	2005	2006	2007	2008	2009	2010
Additional vacancies		+2 500	+2 500	+2 500	+2 500	+2 500
Accumulated new		+2 500	+5 000	+7 500	+10 000	+12 500
Total yearly vacancies	15 000	17 500	20 000	22 500	25 000	27 500

Source: Ministry of Education and Ministry of Work and Social Solidarity, Programme New Opportunities

- Integrate vocational courses in upper secondary schools that traditionally only provided general courses leading to higher education.

Table 1.31 – Estimated new vocational programmes in upper secondary schools

	2005/06	2006/07	2007/08	2008/09	2009/10
New courses	40	100	200	300	450

Source: Ministry of Education and Ministry of Work and Social Solidarity, Programme New Opportunities

- Implement a system for the recognition and certification of competencies and to offer new vocational training opportunities to adults with low qualifications.

The decreasing number of young people is diminishing the demand for higher education, and enhanced competition for students among higher education institutions. This phenomenon favours the reconfiguration and rationalisation of the network of higher education institutions and their study programmes. As demographic trends will take time to reverse, possible ways to increase demand for higher education include improving success rates in upper secondary education, increasing the access of new publics and eventually making upper secondary education compulsory.

The implementation of the Bologna process is also providing pressure for change at the level of higher education. Parliament passed a law adapting the Education System Act (Law 46/86 of 14 October) to the Bologna degree structure and the Government passed a decree regulating the implementation of the new degree system (Decree-Law 74/2006 of 24 March). Higher education institutions will be able to start implementing the new system from 2006/07.

The implementation of the Bologna process will also influence the present national system of quality assessment, as an accreditation system will be implemented in order to meet the European Standards and Guidelines for Quality Assurance in the European Higher Education Area, EHEA, as adopted by ministers in Bergen in May 2005.

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PART II - PUBLIC REGULATION AND INSTITUTIONAL DEVELOPMENT

This part of the report addresses main aspects of public regulation and institutional development in higher education, which represent areas of particular concern in tertiary education in Portugal and worldwide. They shape the relationships between governments, higher education institutions and society at large, which have been subject of recent reforms in many countries.

In Portugal public regulation of tertiary education has been implemented through four basic processes discussed in this part of the report, namely: i) access; ii) social support to students; iii) accreditation and quality assessment; and iv) public funding. The efficiency of most past and existing schemes in Portugal in these four areas has been a major cause of concern, and increasingly questioned by many actors in society. It has also justified the overall evaluation requested to OECD and to ENQA in November 2005. The main data available is briefly described in this part of the report.

Beyond those four processes mentioned, the development of higher education was also determined by the level of institutional development and degree of autonomy, including the management of human resources, which is influenced by the relationship between Government and the institutions. Details related with the institutional characteristics of the network of higher education institutions are provided in Part III of the report.

1. Access to higher education and overall enrolment trends

Table 2.1 presents the increase in enrolment in the public and private sectors, as well as the total enrolment for the higher education system. The 1990's were characterised by the duplication of the students' enrolment, in a way that exhibited an uneven distribution throughout the system. Enrolment in public universities increased by 62%, while enrolment in public polytechnics increased 225% and enrolments in the private sector increased 122%. In 1983/84 the share of enrolments was 78% in public universities, 11% in public polytechnics and 11% in the private sector. In 1990/91 those shares became, respectively, 56%, 17% and 28%, while in 1996/97 those values were 44%, 20% and 36%. In 2000/01 enrolment shares were, respectively, 44%, 27% and 30%, and in 2004/05 these values were 45%, 29% and 26%.

Initially the development was mainly determined by the private sector, which in 1991 registered a 34% annual enrolment increase (Table 2.2), after increase rates of 23% in 1989 and 33% in 1990. This expansion started to slow down after the mid 1990s and in 1997 it became negative, a trend that has not changed until today. Public polytechnics registered a more sustained expansion (Table 2.2) and their total enrolment is today higher than that of the total private sector, although they present a recent tendency towards decreasing enrolments. This slow-down of enrolments was also observed for public universities since 2003.

Successive governments consistently used access to higher education to regulate the system and parts of the sub-sectors, with *numerus clausus* used to control the number of vacancies in every study programme. Students enter higher education by means of a national competition and a centralised placement system that takes into account the students' preferences and their grades. After an education route of 12 years (9 years of basic education and 3 years of upper secondary education), the eligibility

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conditions to enter a higher education programme requires the combination of the students' performance in upper secondary education with their performance in the national examinations in the core disciplines for the chosen study programme.

Table 2.1 – Enrolments for the different sectors of the higher education system (Graduate and post-graduate degree programmes)

	Enrolments in higher education institutions at 31st December													
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Public														
University	111 550	119 292	126 009	131 309	138 286	146 499	150 493	155 563	160 970	167 435	171 014	171 667	169 481	165 866
Armed forces ^a	1042	1 015	994	890	835	850	907	917	996	1 082	1 138	1 163	1 252	1 352
Total P.Univ.	112 592	120 307	127 003	132 199	139 121	147 349	151 400	156 480	161 966	168 517	172 152	172 830	170 733	167 218
Polyt- General	36 220	43 085	48 262	53 032	58 482	64 187	71 458	78 889	89 101	100 481	106 889	110 761	109 641	107 518
Polyt- Others	532	702	722	755	897	885	928	839	929	1 116	1 279	1 430	1 473	502
Armed forces ^a	323	339	222	300	294	305	305	279	256	198	318	341	368	356
Total P. Polyt.	37 075	44 126	49 206	54 087	59 673	65 377	72 691	80 007	90 286	101 795	108 486	112 532	111 482	108 376
Total Public	149 667	164 433	176 209	186 286	198 794	212 726	224 091	236 487	252 252	270 312	280 638	285 362	282 215	275 594
Private														
University	29 637	33 750	36 541	41 369	43 623	48 528	46 207	50 022	48 560	43 949	41 331	38 789	36 071	31 981
Other schools	31 285	39 228	48 426	53 220	61 444	62 380	64 243	57 313	59 711	59 501	60 186	60 915	59 797	56 161
Catholic univ.	7 728	8 671	8 813	9 473	9 574	10 491	10 327	10 528	10 267	10 560	10 136	10 412	10 641	10 213
Total Private	68 650	81 649	93 780	104 062	114 641	121 399	120 777	117 863	118 538	114 010	111 653	110 116	106 509	98 355
TOTAL	218 317	246 082	269 989	290 348	313 435	334 125	344 868	354 350	370 790	384 322	392 291	395 478	388 724	373 949
GPR 20-24 ^b %	27.6	30.5	32.8	34.6	37.0	40.0	42.2	44.2	47.3	49.8	51.7	52.9	52.9	-

Notes: a – Police and military schools; b – Gross participation rate 20-24 years;

Source: OCES, 2005

Table 2.2 – Higher education enrolments' annual increase (%)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Public													
Universities	6.9	5.6	4.1	5.2	5.9	2.7	3.4	3.5	4.0	2.2	0.4	-1.2	-2.1
Polytechnics	19.0	11.5	9.9	10.3	9.6	11.2	10.1	12.8	12.7	6.6	3.7	-0.9	-2.8
Sub-Total Public	9.9	7.2	5.7	6.7	7.0	5.3	5.5	6.7	7.2	3.8	1.7	-1.1	-2.3
Private sector	18.9	14.9	11.05	10.25	5.9	-0.5	-2.4	0.6	-3.8	-2.1	-1.4	-3.3	-7.7
TOTAL	12.7	9.7	7.5	8.0	6.6	3.2	2.7	4.6	3.6	2.1	0.8	-1.7	-3.8

Source: OCES, 2005

Figure 2.1 quantifies the evolution of public vacancies and candidates since the late 1970's and identifies a major change in 1989, associated with an increase of over 20,000 candidates (more than 60%) relative to the previous year, which the public sector could not accommodate. This was due to the government's decision that entrance examinations were only to be used for ranking students in the national tender for vacancies, without required minimum marks for admission. As a result, the private share of student enrolments jumped from 10% in 1982-83 to 24% in 1989-90, and to 36% in 1996-97.

A second major change in the number of candidates occurred in 1994 with a reform of upper secondary education that facilitated access to higher education. However, by 1996 access conditions became very much determined by demographic factors, and since then the number of candidates has continuously decreased until 2002, becoming more stable since then.

Legislation introduced in the mid 1990s implemented pass examinations at the end of the 10th and 11th grades of secondary education, and national examinations for each subject at the end of the 12th

grade, while allowing higher education institutions, or even encouraging them, to set minimum marks in the access examinations to higher education.

Analysis from the mid 1990's shows different factors affecting access to higher education, namely: a consistent decline in the number of candidates due to changes in demography; increasingly difficult conditions to enter higher education by reintroducing national examinations at the end of the upper secondary education; and increasing public vacancies, due to large investments made in the public sector. Institutional responses to the increased competition for students differed, with a few of the most recognised institutions setting high minimum marks, while less prestigious institutions set lower entrance standards, thus making evident to the general public the different strategies of institutions and the different segments of the student population they were aiming at attracting.

Figure 2.1 – Number of public vacancies (series 1) and candidates (series 2), for 1978 - 2005

Source: OCES, 2006

The recent introduction of the Portuguese Comprehensive Law on the Education System (i.e., “Lei de Bases do Sistema Educativo”) of August 2005, followed by Decree-Law 74/06, of 24 March, adapted the system to the Bologna principles, and introduced a national accreditation system and a new regulatory framework.

In parallel with the “Bologna reform”, two major regulatory initiatives were implemented from the academic year 2005/06:

- access rules enforced minimum grades of 95/200 in the national access examinations for all candidates in every sector of higher education; and
- a minimum number of 10 students per degree programme was required for public funding, with this limit being announced to increase to 20 students from 2006/07.

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Table 2.3 quantifies the number of education programmes with less than 10 enrolments in 2004-2005 in public universities and polytechnics (186 degree programmes, overall) and shows the impact of the measure implemented in 2005/06 to help rationalise resources in higher education.

Table 2.3 – Number of education programmes with less than 10 new enrolments in 2004-2005 in public higher education (ISCED 5)

Fields of education and training	Number of Education Programmes (ISCED 5)		%
	1st year, 1st time <10 in 2004-2005	Still open in 2005-2006	
1 Education	30	14	47%
2 Humanities and Arts	47	30	64%
3 Social Sciences, Business and Law	5	3	60%
4 Science, Mathematics and Computing	27	16	59%
5 Engineering, Manufacturing and Construction	26	18	69%
6 Agriculture and Veterinary	16	10	63%
7 Health and Welfare	5	2	40%
8 Services	30	17	57%
TOTAL	186	110	59%

Tables 2.4 and 2.5 present the degree programmes offered in public and private institutions during 2005/06, using the number of new students enrolled in the first year for the first time. It shows that only 32% of the supply of degree programmes in public universities had more than 49 new students, while this value was as low as 17% and 15% in the public polytechnic and private sub-systems, respectively. These degree programmes accommodated 67% of the new students enrolled in public universities, and 42% and 56% of those enrolled for the first time in public polytechnics and in private institutions, respectively.

Table 2.5 shows that, in 2005/06, there were 174 degree programmes in public universities with less than 20 new students, which represented only 6% of the overall number of new enrolments. There were also, 215 degree programmes in public polytechnics with less than 20 new students, which represented only 11% of the overall number of new enrolments in polytechnics.

For the private system, Table 2.5 shows that 189 degree programmes did not have any students, while there were 210 degree programmes with less to 20 new students, which represented only 14% of the total number of new enrolments.

Table 2.4 – Number of education programmes in higher education, according to the level of total enrolments, 2005-2006 (ISCED 5)

Nr. of enrollments in the 1st year, first time	Public System				Private System		TOTAL
	Universities	%	Polytechnic	%	Total	%	
0	13	2%	12	2%	189	30%	214
1-9	69	12%	96	17%	87	14%	252
10-19	92	16%	107	18%	123	19%	322
20-49	211	37%	263	45%	138	22%	613
>49	181	32%	101	17%	94	15%	376
TOTAL	566	100%	579	100%	631	100%	1778

Table 2.5 – Number of new enrolments in higher education, according to the level of total enrolments in specific education programmes, 2005-2006 (ISCED 5)

Nr. of enrollments in the 1st year, first time	Public System				Private System		TOTAL
	Universities	%	Polytechnic	%	Total	%	
0	0	0%	0	0%	0	0%	0
1-9	343	1%	518	3%	508	3%	1.369
10-19	1.283	5%	1.545	8%	1.747	11%	4.575
20-49	7.074	26%	8.880	47%	4.451	29%	20.406
>49	18.055	67%	7.786	42%	8.549	56%	34.391
TOTAL	26.755	100%	18.729	100%	15.255	100%	60.741

Female enrolment in higher education

Table 2.6 quantifies the increasing percentage of female students in higher education, which is explained by various factors, including the progressive liberalisation of social conventions, but above all due to the high rate of female participation in the labour force. This occurred initially at the lower qualification levels, due to the acceleration of industrialisation, largely supported by labour intensive industries, and associated with the integration of the Portuguese economy within the European Free Trade Association (EFTA). These industries heavily recruited female workers. Later, during the 1960s and early 1970s, a growing proportion of males were drafted to the colonial war, thus opening new opportunities for women in terms of higher education and the labour market.

Table 2.6 – Percentage of female students in higher education

Sector	1961	1971	1980	1991	1997	2003	2004
Public	–	43.8	43.6	55.4	54.6	54.1	53.8
Private	–	53.6	46.3	56.4	60.8	61.6	61.3
University	–	45.8	46.4	55.2	55.2	54.2	53.3
Polytechnic	–	34.6	33.3	60.1	58.5	58.6	58.9
All institutions	29.1	44.4	43.9	55.5	56.6	56.2	55.8

Source: Barreto 1996; OCES various years

In the early 1990s women became the majority of enrolled students and graduates in all sub-systems of higher education. This might be explained by the higher success rate of female students in compulsory education and upper secondary education (Table 1.20, early leaves from secondary school). However, the expansion has not been uniform across disciplines. Initially it began in those areas regarded as socially more acceptable and those that more easily allowed women to pursue a professional career. Eventually, a growing proportion emerged in less traditional areas such as economics, law and engineering, and today they are a majority in every programme except the more technological ones. Their significant presence in polytechnic schools (Table 2.6) might be explained by the fact that this sector includes the colleges of education and nursing with high percentage of female students. Also, the high percentage of women in the private sector might be explained by factors such as fewer technological programmes and higher percentage of teacher training and health courses in this sub-sector.

On the socio-economic origins of students

The nature of the Portuguese higher education system is reflected by the socio-economic composition of student enrolments. Until the 1970s enrolments were low, the number of candidates being restricted by the low literacy levels of the population. Those few students graduating from secondary education and

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struggling to remain in the system faced adversity, as families were unwilling or unable to invest in their children's education. Employment opportunities were somewhat limited. Qualified labour could either join the civil service or find employment with a few industrial groups that expanded their activities in the highly protected economic system of corporatism and colonialism.

The expansion of higher education during the 1960s was associated with important economic transformations occurring during that decade, namely a period of accelerated economic growth and, above all, increasing pressure for economic liberalisation. The student population in the 1960s had a high proportion of students whose father had a higher education degree, or at least some secondary education. Bearing in mind the poor levels of literacy of the overall population, this shows a clear over-representation of those groups with higher cultural capital and an under-representation of those from more deprived backgrounds. Analysis has shown that in the following decades this picture changed, with increasing access for students from families with limited qualifications. However, families with formal qualifications well above the average retained their traditional prominence.

Nevertheless, changes to the social composition of the student population were not homogeneous across sub-sectors (Table 2.7). First, public universities have a more homogeneous population in terms of cultural capital than public polytechnics, suggesting that students from families with lower qualifications choose shorter vocational degrees. Second, there are no major differences between public universities and private institutions in terms of cultural capital of origin.

The analysis of enrolments by level of income mostly confirms the influence of cultural capital on enrolment patterns (Table 2.8). Public polytechnics are clearly more socially inclusive than public universities. Again, in terms of the students' economic level there are no major differences between public universities and private institutions. This suggests that middle and upper class groups with higher cultural capital retained a good grip on access to the most prestigious institutions and programmes (Vieira, 1995).

The EUROSTUDENT 2005 survey confirms that the university-polytechnic divide presents a clearer difference between the socio-economic family origins of the students in the Portuguese higher education system than the public-private divide.

Table 2.7 – Distribution of enrolments by level of schooling of the household^a (%)

Level	63/64	91/92	1997				2004			
			Public univer.	Public polytech.	Private	Total	Public univers.	Public polytech.	Private	Total
Illiterate/ Primary	35.2	25.3	39.3	53.3	47.2	45.0	30.0	50.0	27.2	34.9
Secondary	27.4	19.2	35.7	36.3	34.4	35.4	29.2	29.6	29.4	29.4
Vocational degree	8.7	8.1				6.5	–	–	–	–
Higher education	27.5	18.1	24.7	10.4	18.3	13.1	40.8	20.4	43.4	35.7
Other/NA	1.2	27.1					–	–	–	–

a – level of schooling of the parent with highest income

Source: Vieira (1995); CNASES (1997); CIES-ISCTE. (2005)

Table 2.8 – Enrolments by level of household income, 2004

Household income	Public university	Public polytechnic	Private institution	Total
€	%	%	%	%
Less than 720	13.6	20.1	11.2	14.8
721–1440	28.5	38.8	26.0	30.7
1441–2160	21.6	22.2	19.3	21.1
2161–2880	15.2	10.9	16.9	14.5
More than 2880	21.1	8.0	26.6	18.9

Source: CIES-ISCTE (2005)

It should be noted that only about 19% of the overall number of higher education students in Portugal reported having some work experience prior to enrolment in higher education. This clearly contrasts with typical figures in northern European countries (Figure 2.2).

Figure 2.2. Fraction of higher education students with previous work experience, prior to enrolment in higher education, 2004

In addition, Figure 2.3 shows that the large majority of students in Portugal do not receive any remuneration from working during their enrolment in higher education, which makes families the main source of income for students (Figures 1.8 and 1.9).

Figure 2.3. Fraction of higher education students with remunerations for working at least 1 hour/week (i.e., “Trabalhadores estudantes”), 2004;

Student mobility

Figure 2.4 compares the fraction of higher education students with experience in studying abroad for several European countries and, for example, shows that the fraction of Spanish students with experience abroad is almost three times larger than that for Portugal. This experience has been promoted above all through the Erasmus Programme and, again, families must support a large part of the costs of their students studying abroad.

In terms of national mobility, another dimension of the selective nature of the Portuguese higher education system was its high regional concentration. Until the early 1970s there were no universities outside the three major cities (Lisbon, Porto, Coimbra). The regional expansion of the system started slowly, before becoming an important characteristic from the mid-1980s onwards. Arguably, the main driving force of regional diversification was the development of the polytechnic public sector. Public polytechnics had strong regional orientation ever since their creation and were always regarded as the primary instrument for providing higher education to the more remote areas of the country.

Figure 2.4. Fraction of higher education students with experience in studying abroad, 2004;

Regional expansion of higher education – especially of the public network – had initially a small impact on geographical mobility, as the establishment of new institutions started by attracting candidates of the surrounding regions. By the mid-1990s the proportion of the total number of applicants and successful applicants coming from the same region to the institutions located in the two most populated regions (Lisbon and Porto) was over 60%. In contrast, regions with smaller populations were filling about half of their vacancies with candidates from outside their region. Distance to the institution is one of the main determinants of students' preferences.

There is an increasing pattern of student mobility between study programmes and between institutions, which is determined by the number of vacancies that institutions open for specific purposes. Table 2.9 quantifies the students that change programme and institution for the academic year 2004/05 (first year enrolments) and shows that some 12% of students change their choice of programme, 3% move to other institution and only 1% are students aged over 25 years and have access to the university through a special entrance system for students not holding an upper secondary school diploma.

Table 2.9 – Students changing programme and institution, 1st year, 2004-05

	% filled vacancies	New students	Change of programme	Change of institution	≥ 25 years old
Public universities	86.8	21 201	2 083	524	238
Public polytechnics	79.6	14 111	1 799	418	145
Private institutions	48.0	13 362	1 880	711	168
Total	69.7	49 674	5 762	1 653	551

Source: OCES, 2005

2. Students' social support system

The Portuguese higher education student social support system aims to mitigate the economic difficulties faced by students from disadvantaged social backgrounds. This is particularly important since the last decade was characterised by increasing cost-sharing, both by raising the level of tuition fees in public institutions and by expanding full-cost fee private institutions.

Decree-Law 132/80 of 17 May has established a comprehensive student support system by creating an autonomous service associated to each university or university institute. At the time these services were

given more financial and administrative autonomy than universities, as well as a flexible human resources management system, as the staffs for students' residences and restaurants were hired under private law. These services were directly managed by the rectors, assisted by a vice-president nominated by the rector but appointed through the Government.

The implementation of institutional autonomy, in 1988, for the Universities, and 1990, for the Polytechnics, had an important impact upon the students' support system. The University Autonomy Act conferred public universities an increased degree of autonomy and responsibility for staff and students, and committed the rector to define the policy for the students' support system. Decree-Law 129/93 of 22 April extended the authority of the universities over the social support services, by formally integrated them into the university as one of its units. However, some of the former management flexibility was lost, as all the staff became public servants. Polytechnics followed a similar path.

In the early 1990's social support policies became entangled with the government's attempts at increasing cost-sharing by raising tuition fees for the public sector. In Portugal the nominal value of public tuition fees had been frozen since 1941, and in 1990 students enrolled in public higher education institutions paid only about €6 a year. Furthermore, the 1976 Portuguese Constitution determined that higher education must become progressively free of charge. However, the Constitutional Court ruled that although tuition fees could not be raised, updating their value by taking into account inflation since 1941 was not considered a price increase. Therefore, the Parliament passed Law 20/92 of 14 August updating tuition fees under strong student protests. The new Law stated that tuition fees were revenue of the institutions to be used mainly for the students' social support and for promoting academic success, thus attempting to pacify students.

Tuition fees remained a hot political issue throughout the 1990s. In 1997, the Parliament (Law 113/97, 16 of September) reintroduced updated tuition fees but limited its yearly value to the national minimum wage, thus protecting students against any sweeping tuition increases. The law also extended 'progressively' student social support services to students enrolled in private institutions.

In 2002 the Parliament passed a new law (Law 37/2003, of 22 August that replaced Law 113/1997) establishing a new framework for financing higher education. The major change was that it allowed public higher education institutions to set the value of tuition fees between a minimum of 1.3 times the minimum monthly wage and a maximum determined by updating the value of 1941 to inflation.

The new 2003 law maintained that tuition revenues should be used to promote quality, which was to be measured by appropriate performance indicators, and emphatically stated that students from disadvantaged social-economic backgrounds should not be excluded from higher education for economic reasons, provided their academic merit was demonstrated.

At present, the students' social support system includes direct and indirect support mechanisms, independently of the type of institution (public or private, university or polytechnic). The direct support consists of means tested grants (scholarships) for needy students that demonstrate academic merit. These grants are awarded yearly and are meant to contribute to the students' expenses (housing, meals, transportation, tuition fees, etc.). The value of the grants depends on the per capita income of the student's family (or their own, in the case of independent students³), and consists of a monthly maximum equivalent to the minimum wage and a minimum equal to one-twentieth of that value (Oliveira and Pereira, 1999). Because fees are revenues of higher education institutions, the law determined that the grants included the amount necessary to pay for the fees, instead of adopting a fees remission policy. The indirect support

³ Students are considered independent if they live away from their parents' home, having sufficient financial means to maintain themselves (including housing) but not to pay for their studies

consists of housing in halls of residence (with priority given to displaced students with grants), subsidised meals in canteens, and other services related to health, culture and sports.

The expenditure in students' social support increased faster than the expenditure in higher education, the latter increasing also faster than the expenditure in education (in 2001 higher education represented about 20% of the public expenditure with education). Public expenditure in education increased from 1.5 % of the GDP in 1974 to 5.5% of the GDP in 2001⁴. From 1988 to 2001, public expenditure in education and higher education increased from 4.0% to 5.5% of the GDP and from 0.46% to 1.13% of the GDP, respectively.

Figure 2.5 indicates the percentage of students with public grants in the various sub-systems, and shows that public universities have a higher percentage of grants than public polytechnics although students from the less affluent backgrounds are more present in the polytechnic sector.

To overcome the differences between the private and the public sub-systems (in 1991 the private sub-system received 29% of all students enrolled in HE and only 3% of the public expenses in student social support), the grant system was extended to the private sub-sector in 1997, with an extra allowance to compensate for the higher fees in the private sector⁵. Nevertheless the State established a limit to the amount awarded for tuition, to deter private institutions from excessively increasing fees.

The more equitable treatment of students in public and private institutions is confirmed by the analysis of the evolution of the total funds per sub-system and the average value of grants, as shown in figure 2.6 and table 2.10. Grants became on average higher for students enrolled in the private sector, and that explains why the budget for the private sector already exceeds the budget for public polytechnics. It is important to notice, in this context, that a large fraction of students only receive a grant equal to the tuition fee, which explains the low average annual values of grants in public universities and polytechnics.

⁴ The collected data on education, higher education and social support are not always available by source of financing. So the term "public expense" frequently represents different realities, such as the State budget transferences or the transferences from the budget including own resources from public entities. For such reason the data used will be precisely identified.

⁵ The grant system was extended to private sector only in 1997, when there was already a clear tendency of decreasing enrolments in this HE sub-sector. However decreasing enrolments have continued in private higher education after the extension of the grants' system to this sub-sector.

Figure 2.5 – Percentage of students with grants in public universities, public polytechnics and private institutions;

Source: DEPGEF, FAE, DGESUP and DSAT.

Table 2.11 extends the information provided in Figure 1.5 and quantifies the type of residence used by higher education students in Portugal.

Grants are means-tested, depending on the families' per capita income. Table 2.12 presents the monthly income of students receiving grants and shows that 80% of the grant-holders belong to families with a maximum income of €1 440, while 33% have an income below €720.

Figure 2.6 – Total expenditure in student support (grants) per sub-system

Sources: Medina (2004), DGES (2006)

Table 2.10 – Average annual values of grants (€)

Year	Public Institutions		Private Institutions
	Universities	Polytechnics	
1997	1 580	1 441	3 334
1998	1 373	1 265	3 829
1999	1 335	1 147	3 218
2000	1 279	1 121	2 281
2001	1 387	1 118	2 003
2002	1 491	1 129	1 892
2003	1 329	1 028	1 878
2004	1 481	1 201	1 698

Source: CIES-ISCTE, Eurostudent (2005)

Table 2.11 – The residence of higher education students

Students	Age groups (%)			
	< 20 years old	20-23 years old	24-27 years old	>28 years old
Parents/relatives	56.6	59.0	51.0	25.8
Own house/apartment	5.7	7.3	12.9	53.3
Rented house/apartment	16.8	15.4	14.4	11.6
Individual rented room	11.9	12.2	14.6	5.8
Shared rented room	3.7	2.4	3.3	1.2
Student residence	5.3	3.7	3.8	2.3

Source: CIES-ISCTE, Eurostudent (2005)

Table 2.12 – Parents' net monthly income of students receiving grants (€)

families' <i>per capita</i> income	% of students receiving grants
< 720 €	32.9
721 € – 1440 €	47.1
1441 € – 2160 €	11.6
2161 € – 2880 €	5.0
> 2880 €	3.4
Total	100.0

Source: CIES-ISCTE, Eurostudent (2005)

Table 2.13 characterises the families of grant-holders in terms of their socio-professional category and level of educational attainment. It is not surprising that 73.5% of grant-holders' families have at most completed basic education due to the low qualification level of the Portuguese population. What is perhaps more surprising is that 7.5% of grant-holders belong to families of “entrepreneurs, top management and liberal professionals” and 20.3% belong to families of “executives and specialised professionals”.

Table 2.13 – Characterisation of the parents of undergraduate students with grants

Household of origin	%
Socio-professional categories	
Entrepreneurs, top management, liberal professionals	7.5
Executives and specialised professionals	20.3
Independent workers	8.2
Independent workers, > 1 activity	7.2
Administrative employees	17.0
Blue collar workers	21.2
Salaried workers, > 1 activity	18.6
Total	100.0
Education	
Not more than basic education	73.5
Upper secondary education	13.8
Tertiary education	12.7
Total	100.0

Source: CIES-ISCTE, Eurostudent (2005)

Table 2.14 extends the information of figures 1.8 and 1.9 and quantifies the contribution from both families and students to the costs of attending higher education at undergraduate level. Some 15.5% of all undergraduates contribute to the costs of higher education through their work revenues. For post-graduate education the annual expenditure is much higher than for undergraduate studies and the contribution from the state, although more generous in absolute terms, maintains its proportion of the total costs, while the percentage of students contributing with their work revenues increases very substantially to over 70%.

Tables 2.15 and 2.16 present the monthly average expenditures of students on different items taking into account the type of accommodation (Table 2.15) and the type of institution (Table 2.16). Accommodation is the most relevant item in the expenditures' list and varies from zero for students living with their parents to an average of €296 for those living in own or rented accommodations. Payments to institutions (fees) are lower for students in institutional residences, as a large percentage of them also has a grant and does not pay tuition fees.

Analysis shows that students from private institutions spend more, in absolute terms, than their colleagues from the public sector; the major difference being the higher fees paid to private institutions. Among public institutions, students from polytechnics spend less than those from universities. The item "other expenses" also presents a significant difference between types of institutions, being higher for

students enrolled in private institutions, probably because private institutions have higher concentration in the main towns of Porto and Lisbon, where living costs are also higher.

Table 2.14 – Sources of income (monthly average in € and in %)

Sources of income*	€	%
All students		
Family (money)	337	85.3
Family (intangibles)**	251	61.4
State	195	24.3
Work	625	18.1
Others	263	4.1
Undergraduate studies		
Family (money)	320	87.7
Family (intangibles)	250	62.8
State	155	24.4
Work	490	15.5
Others	214	4.0
Post-graduate studies		
Family (money)	1 173	37.1
Family (intangibles)	299	32.2
State	1 055	22.4
Work	1 213	70.6
Others	822	7.0

*NOTE 1: The calculated average only takes into account students with income from this source. The percentages refer to the proportion of students who in each sub-group state that they receive money from that source.

**NOTE 2: Intangible income refers to transfers in kind or direct payments made by their parents

Source: CIES-ISCTE, Eurostudent (2005)

Table 2.15 – Expenditure items and monthly average costs by type of accommodation

Monthly expenses*	All students		Type of accommodation							
			Parents' home		Own or rented house		Rented room		Student residence	
	€	%	€	%	€	%	€	%	€	%
Accommodation**	2	8	—	—	2	8	2	9	1	7
Food	1	8	8	8	1	9	1	9	1	9
Clothes/hygiene	6	7	6	6	8	7	5	7	4	8
Payments to institutions	1	5	1	5	1	5	1	5	8	6
	47	5.4	54	1.1	58	7.5	23	2.0	1	6.1
Study	5	8	5	7	5	8	4	8	4	8
Transport	5	8	5	7	6	8	5	8	3	8
Computers/Internet	4	4	4	4	4	4	3	3	2	3
Other expenses**	1	5	6	2	1	5	1	5	1	4
Total	5	9	4	9	7	9	5	1	4	9

*NOTE 1: The calculation of the average only takes into account students with income from each source. The percentages refer to the proportion of students who in each sub-group state that they receive money from that source.

**NOTE 2: Including intangible income, this refers to transfers in kind or direct payments made by their parents.

Source: CIES-ISCTE, Eurostudent, 2004

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The small percentage of students that mention expenditure with “accommodation” (31.6% for public universities, 31.8% for public polytechnics and only 19.7% for private institutions) confirms that many students live with their family and that mobility is low. The lower value for the private institutions is consistent with the idea that their students are based locally and will try to keep the costs low. The exception seems to be students that already have local independent accommodation, in which case their average costs are also higher than those for their public university counterparts.

Although there was a legal framework for developing students’ loans for many years, such system remains to be implemented through the approval of regulations and funding. At the same time, students’ loans available from the commercial banking system are extremely limited, with available data listing only 397 students having bank loans for studying in higher education (318 for undergraduate studies, corresponding to 0.06% of the total enrolment, and 79 for post-graduate studies, corresponding to 1.3% of total enrolment). It should be noted that a universal loan system would require a public investment that is hardly compatible with current EU rules on public budget deficits. For example, a loan system for 100,000 students with an individual debt limit of € 20,000, repayable in 15 years, would represent a public investment of almost 1.7% of GDP.

Table 2.16 – Expenditure items and monthly average by educational sector

Total monthly expenditure ¹	All students		Public universities		Public polytechnics		Private	
	€	%	€	%	€	%	€	%
Accommodation	190	28.3	199	31.6	161	31.8	212	19.7
Accommodation ²	216	53.7	201	56.4	181	50.6	317	5.0
Food	108	86.4	115	88.6	92	88.1	112	81.4
Clothes/hygiene	68	69.8	69	68.8	56	72.7	78	68.6
Tuition fees	147	53.7	102	52.3	68	51.9	283	57.9
Study materials/books	54	80.9	52	82.5	40	83.5	75	75.8
Transport	59	80.0	57	81.4	57	80.8	65	77.0
Computers/Internet	41	42.4	37	43.4	30	42.6	61	40.6
Other expenses ³	179	54.7	157	53.0	107	57.6	291	54.4
Total ⁴	495	97.0	465	97.5	370	62.2	672	95.2

¹NOTE1: The calculation of the average only takes into account students with monthly expenditure for the item. The percentages refer to the proportion of students who in each sub-group state that they made expenses on that item in relation to the total number of students in the same sub-group.

²NOTE2: Intangibles, corresponding only to values declared by students not living with their parents; percentage of students with this type of expenditure in relation to the total of those living independently in each sub-group. ³

NOTE3: Including intangibles. ⁴

NOTE4: The average figures for total expenditure on each sub-group do not include payments made directly by the family for accommodation and associated services.

Source: CIES-ISCTE, Eurostudent (2005)

3. Accreditation and quality assessment

A major review of the accreditation and quality assurance practices of Portuguese higher education is being performed by an international review committee formed through the European Network for Quality Assurance in Higher Education, ENQA, following a request made by the Government in November 2005, so that this section only briefly summarizes main issues under analysis. The review committee will provide advice on the current legal framework supporting accreditation and quality assurance methodologies, as well as on appropriate structures for implementing a national accreditation and evaluation agency following current best quality assurance and accreditation practices in Europe.

Although at present there is no national accreditation system, at least when considering international reference terms for independent accreditation of higher education, public regulation of higher education at the level of degree programmes have been largely exercised through the Directorate-General for Higher Education, DGES. This has involved over the last decade diversified arrangements for the different sub-systems of higher education, which may be briefly summarised as follows:

- Public Universities: have full autonomy in the creation and delivery of degree programmes, which are to be registered at DGES;
- Public Polytechnics: the creation of degree programmes requires their prior approval from Government, through DGES;
- Private Institutions: the creation and delivery of degree programmes require prior approval from the Government, through DGES, after assessment by experts' teams, which are nominated by the Government.

This system has resulted in increasing manifestations of concern from polytechnic and, above all, private institutions, claiming against discretionary attitudes and considerable bureaucracy. Table 2.17 quantifies the number of degree-programme proposals submitted to DGES over the last three years and the related approvals.

As a result, the recent alteration of the Portuguese Comprehensive Law on the Education System (i.e., “Lei de Bases do Sistema Educativo”) in August 2005, followed by Decree-Law 74/06, 24 March 2006, adapted the system to the Bologna principles and introduced a national accreditation system.

Table 2.17 – Number of new degree programmes requested, approved and registered at DGES for 2003-2005

a) Number of public university degree programmes registered at DGES

Degree Type	2003	2004	2005
Bacharelato	1		
Licenciatura	33	42	16
Master	103	114	109
PhD	10	7	16
Total	147	163	141

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b) Number of public polytechnic degree programmes requested and approved/registered

Degree Type	2003		2004		2005	
	Requests	Approved / Registered	Requests	Approved / Registered	Requests	Approved / Registered
Bacharelato	4	3	4	2	7	4
Bacharelato+Licenciatura	49	10	51	36	80	38
Licenciatura	5	1	5	2	7	1
Total	58	14	60	40	94	43

c) Number of degree programmes requested from private institutions and approved

Degree Type	2003		2004		2005	
	Requests	Approved	Requests	Approved	Requests	Approved
Bacharelato	0	1	0	2	3	0
Bacharelato+Licenciatura	13	23	24	3	16	10
Licenciatura	39	15	45	34	62	15
Master	37	21	54	15	59	34
PhD	0	0	3	1	17	2
Total	89	60	126	55	157	61

Quality assurance of higher education in Portugal was based on the Higher Education Evaluation Act, Law 38/94, passed by Parliament in November 1994, which was closely developed in collaboration with the Council of Rectors of Public Universities, CRUP.

The quality assurance system established by Law 38/94 was implemented over the last decade with characteristics that might be summarised as follows:

- the evaluation process to all higher education institutions and in two phases: self- and external evaluation;
- the responsibility for the coordination of external evaluation lays with representative entities which must be recognised as such by the Government.
- there are no direct links between the results of the evaluation and the financing of teaching activities, although continued negative results may have consequences on financing and on the recognition of degrees. However, the formula for the funding of higher education institutions does not contain any component dependent on the results of quality evaluation;
- the system aims at the improvement of the quality of higher education in the different fields of study, taking specially into account the nature and typology of teaching, the qualification of the academic staff and the conditions of functioning.

Soon after the publication of Law 38/94, the Minister of Education signed a protocol with the Presidents of CRUP and FUP, which recognised the Foundation of Portuguese Universities (FUP) as the representative entity for the public universities and the Catholic University and defined the general guidelines to be met by the evaluation system. A direct consequence of this process was that the pilot project launched by CRUP in 1993 was integrated into the new framework and considered as the “first

round of evaluations” to be concluded until 1999 under the coordination of the evaluation council already established by FUP.

The other sectors of higher education organised themselves for the creation of their own evaluation agencies, but had to wait for regulation that was finally established by Decree-Law 205/98, of 11 July, which instituted the practical principles for the recognition of the representative entities and created the National Council for the Evaluation of Higher Education (CNAVES), as a global coordinating body of the evaluation system. It includes people from the different sub-systems (i.e., public universities and polytechnics and private institutions), together with representatives from the Government and, therefore, it represented the system of higher education itself. A few foreign members were initially invited, but never had any significant role. For the operation of CNAVES, the protocols for the recognition of the new representative entities – the Association of the Portuguese Polytechnic Institutes (ADISPOR) and the Portuguese Association of Private Higher Education (APESP) – were only signed in December 1998 and March 1999, respectively.

The representative entities created four evaluation councils, corresponding to the different higher education sectors:

- the Evaluation Council for Public Universities (includes also the Catholic University and the military institutions for university education), managed through FUP;
- the Evaluation Council for Public Polytechnics, managed through ADISPOR;
- the Evaluation Council for Private Universities, managed through APESP;
- the Evaluation Council for Private Polytechnics managed through APESP.

The responsibility for the harmony, cohesion and credibility of the national quality assurance system rests with the CNAVES, bearing in mind the observance of standards for the overall operation of the system. Specific responsibilities of CNAVES are:

- to coordinate the proposals from the evaluation councils to ensure that the same review teams for external evaluation apply to both the public and the private sectors in each field of studies;
- to ensure the same guidelines for self-evaluation within the University and the Polytechnic subsystems, allowing however for differentiation between them;
- to produce global and prospective reports on quality assurance in higher education, as well as to issue recommendations for the rationalisation and improvement of the higher education system.

Two rounds of programme evaluations have taken place. The first round (1995-2000) included only the public universities and the Catholic University. It was exclusively a programme-oriented exercise, assessing 376 programmes in 44 fields of study. The second round (2000-2005) continued to be programme-oriented and included programmes at all the higher education institutions, assessing a total of 1 209 degree programmes (432 in public universities, 164 in private universities, 421 in public polytechnics and 192 in private polytechnics) (Table 2.18). The review teams involved 637 experts for the university subsystem, of which only 16% were foreign and 18% were from the external community, and 524 experts for the polytechnic subsystem (only with 4% foreign, 9% non-academics, 46% from the universities and 41% affiliated to polytechnic institutions). It should be noted that successive Governments took no action or position based on the reports from the evaluation teams.

Table 2.18 – Number of degree programmes evaluated through CNAVES

Year	University Study Programmes			Polytechnic Study Programmes			
	Public	Private	Total	Public	Private	Total	
2000/01	86	11	97	66	61	127	
2001/02	141	59	200	57	46	103	
2002/03	100	24	124	75	13	88	
2003/04	49	32	81	98	39	137	
2004/05	56	38	94	125	33	158	
TOTAL	432	164	596	421	192	613	

Source: CNAVES; 2006

Professional accreditation

Professional accreditation has been pursued through professional associations. These are public corporations for liberal professions (lawyers, doctors, engineers and pharmacists), which are organised in the form of public bodies with an associative basis (i.e., “statutory membership organisations” in the English terminology), working within the public law. As the Constitution of the Portuguese Republic grants the freedom of professional exercise, professional associations with power to limit or to condition access need to be established by an Act of Parliament or by a government Decree-Law duly authorised by Parliament.

The requirements for becoming an effective member of a professional association vary substantially within each profession. In some cases holding the appropriate degree is a sufficient condition. In other cases admission follows a training period and/or an examination. In 1994 the Engineers’ Association (i.e., “Ordem dos Engenheiros”) established a system of accreditation, and apparently other professional associations are following suite. As a general rule when an accreditation system exists, graduates from accredited higher education institutions have direct access to effective membership. In the case of engineering, the accreditation system uses a methodology that is quite similar to the national quality assurance system. More complete information can be obtained from FEANI’s site in the NET: <http://www.feani.org/>.

The Architects’ Association also established an accreditation system similar to that of the Engineering, which was recently modified. The new statutes of the Pharmacists’ Association approved by Decree-Law 288/2001 of 10 of November allowed the association to start accreditation procedures. None of the other Professional associations has so far established a system of accreditation, and the statutes do not necessarily confer this capacity to them.

4. Public Funding of higher education

Portugal has spent 5.9% of the GDP in education in 2001, and this figure compares against an average of 5.1% for EU25 and 4.6% for Germany, 3.9% for Greece, 4.4% for Spain, 5.7% for France, 4.3% for Ireland, 5.0% for Italy and the Netherlands, 5.9% for Austria and 4.7% for the UK (EUROSTAT, 2004). Also in 2001, the percentage of expenditure with education relative to the total public expenditure was 12.8% in Portugal, against 10.8% for EU25 and 9.7% for Germany, 8.2% for Greece, 11.1% for Spain, 11.2% for France, 12.9% for Ireland, 10.2% for Italy, 10.7% for the Netherlands, 11.2% for Austria and 11.9% for the UK (EUROSTAT, 2004).

Figure 2.7 shows typical OECD data indicating that public expenditure on higher education in Portugal was in 2001 similar to that of the average Europe, EU15, and about 1.04% of GDP, although the figures for Portugal do not include the investment of private sources of higher education. However, when comparisons are made using absolute values of total per capita funding (i.e., total public and private

expenditure per student, including families and other private agents), the results for Portugal (and also for other southern European countries) are lower than for other OECD countries. There are some reasons why this happens in Portugal. First, in Portugal total student enrolments do not take into account the percentage of part-time students, which means that the calculated per capita funding is lower than if calculated using enrolments in FTEs. Second, some research funds are directly allocated to financially autonomous research centres, and not through the universities budgets, except the percentage allocated as institutional overheads. Also, reimbursable funds such as income contingency loans have not yet been used in Portugal, namely to support students in their personal and living expenses, which also helps to explain major differences in relation to other northern European and OECD countries, as presented in Figure 2.8.

Figure 2.7 – Public expenditure on higher education, as a fraction of GDP (%)

Source: "Education Across Europe 2003", Eurostat; data from last year available or 2000

Figure 2.8 – Public subsidies for education in tertiary education, 2002

Note: The chart presents different public subsidies for education to households and other private entities as percentage of total public expenditure on education, by type of subsidy. Public subsidies to households provide finance as grants or loans, and include: i)

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grants/scholarships; ii) public student loans; iii) family or child allowances contingent on student status; iv) public subsidies in cash or kind such as housing and transport; and v) subsidies to permit low-interest loans from private lenders.

Adapted from: OECD (2005), *Education at a Glance: OECD Indicators 2005*, OECD, Paris.

Table 2.19 shows the evolution of the annual budget for Science and Technology, Information Society and Higher Education for 2005-2006, as presented to the Parliament by Government for MCTES, which quantifies an increase of 17% in S&T, maintaining the overall level of expenditure in higher education, together with a considerable decrease in the public support of infra-structures.

Table 2.19 – Overall annual budget for Science and Technology, Information Society and Higher Education (as presented by Government for MCTES) for 2005 and 2006

	Unit: €		
	2005	2006	Variation (%)
Science and Technology	335 022 495	392 232 372	17.1
Information Society	138 998 098	147 904 824	6.4
Higher Education	1 734 338 129	1 766 861 805	1.9
Higher Education (current expenses)	1 420 189 201	1 468 370 035	3.4
Social support system (grants, accommodation, meals)	191 900 499	204 744 588	6.7
Infra-structures (buildings and equipment)	122 248 429	93 747 182	-23.3
Administration and general services	11 012 681	12 020 234	9.1
TOTAL	2 219 371 403	2 319 019 235	4.5

Table 2.20 a) quantifies the sources of funding for Science and Technology, Information Society and Higher Education (as presented by Government for MCTES) for 2006. The results show private income (including tuition fees, but also other income) with about 40% of the overall budget for higher education, with a share among public universities and polytechnics as quantified in Table 2.20 b).

Table 2.20 – Sources of funding for 2006

a) Sources of funding for Science and Technology, Information Society and Higher Education (as presented by Government for MCTES)

	Unit: €			
	State Budget	Private income	European Structural Funds	Total
Science and Technology	219 989 671	21 112 182	151 130 519	392 232 372
Information Society	42 434 946	3 343 534	102 126 344	147 904 824
Higher Education	1 266 038 728	447 342 049	53 481 028	1 766 861 805
current expenses (includes tuition fees)	1 077 303 628	391 066 407		1 468 370 035
Social support system	155 735 100	49 009 488		204 744 588
Infra-structures (buildings and equip.)	33 000 000	7 266 154	53 481 028	93 747 182
Administration and general services	11 909 545	110 689		12 020 234
TOTAL	1 540 372 890	471 908 454	306 737 891	2 319 019 235

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b) Sources of funding for Higher Education (as presented by Government)

Unit: €

	State Budget	Private income	European Structural Funds	Total
Sub-total for higher education – running costs)	1 077 303 628	391 066 407		1 468 370 035
Universities	745 486 472	294 417 131		1 039 903 603
Polytechnics	285 405 227	88 882 950		374 288 177
Other (schools not integrated) (1)	26 180 667	7 269 341		33 450 008
Contractual Funding	20 231 262	496 985		20 728 247
Sub-total for social support system	155 735 100	49 009 488		204 744 588
Universities	74 570 472	31 192 138		105 762 610
Polytechnics	34 219 628	13 717 350		47 936 978
EUL: University sports	1 025 000	4 100 000		5 125 000
Other social support (Private system)	45 920 000			45 920 000
Sub-total Investments (buildings)	33 000 000	7 266 154	53 481 028	93 747 182
TOTAL	1 266 038 728	447 342 049	53 481 028	1 766 861 805

(1) Escolas Superiores de Enfermagem; Escola Superior de Hotelaria e Turismo do Estoril

Public funding for higher education, including teaching and research activities, is based on the main mechanisms described in Figure 2.9, namely:

- Public funding of higher education institutions:
 - Direct basic funding of public institutions (through funding formula);
 - Contractual funding of institutions (through contracts for specific issues);
 - Direct funding of social support services (through funding formula since 2006) for: i) direct funding to students (i.e., social support of individual grants); and ii) indirect funding to students (i.e., meals, accommodation, sports, healthcare).
- Public funding for science and technology, S&T:
 - Direct funding of institutions through R&D units based on their periodic evaluation and number of PhD researchers (through the Portuguese Science and Technology Foundation, FCT, defined upon evaluations every 3 years);
 - Contractual funding of institutions (e.g., Associate Laboratories);
 - Competitive funding for R&D activities (through R&D projects);
 - Competitive funding for people (through individual grants for research students and contracts for researchers).
- Public funding for infrastructures (i.e., buildings and equipment)
- Public funding for the diffusion of information and communication technologies

Public funding of higher education institutions

Public funding of higher education institutions is implemented through central administration offices at the level of universities, polytechnic institutes and/or their schools (depending on internal autonomy levels) and includes three main components: i) basic funding through a funding formula; ii) contractual funding; and iii) direct funding of social support services (through a funding formula since 2006) for direct support through individual grants for students and for indirect funding of students through meals, accommodation, sports and healthcare.

Direct basic funding of public institutions has been based on a formula since the early 90's, which was used to distribute the overall annual budget among public universities and polytechnics to cover for their running costs. The initial formula was designed in close collaboration with the Council of Rectors, CRUP, and the Coordinating Council of the Portuguese Polytechnics Institutes, CCISP, and it has evolved with time based on successive negotiations with CRUP and CCISP.

The distribution of funding through the formula is related with the costs supported by higher education institutions in their activity, related to the number of enrolled students, varying according to specific costs of each institution (in a way to account for diversity in the qualifications of teaching and non-teaching staffs) and the field of study (i.e., protecting some degrees that need more practical or laboratory classes, e.g., medical sciences and engineering). In general the formula takes into consideration the following aspects:

- the teacher/student ratio;
- the non-teaching staff/teacher ratio;
- the standard composition of the teaching and non-teaching staffs;
- the expenditure (and structure) of central administration (based on central administration personnel/student ratio); and
- the budget structure expressed in the percentage composition of personnel costs and other operational costs.

Figure 2.9 – Main public funding mechanisms for education and research in higher education institutions

More recently, the allocation rationale changed to become progressively performance-based. For the 2006 budget the Government adopted a new formula that aims at allocating the available total budget by progressively introducing criteria related to quality and to performance. It should be noted that under the current context of excess capacity, higher education institutions compete for students, so that the number of students represent some level of performance, at least in terms of the attraction capacity of each course/institution. The new formula is based on the overall number of students, but includes the following quality factors:

- qualification of the teaching staff, as measured by the fraction of PhDs in the total number of teachers of each institution;
- graduation rate, as measured by two indicators:
 - the number of graduates in relation to total enrolments in initial training;
 - the number of masters and PhD degrees awarded, in relation to teachers holding a PhD.

The formula includes the following two institutional factors to answer to specific characteristics of each individual institution and training area:

- average personnel cost for each institution, to account for the specific characteristics of the teaching and non-teaching staffs of each institution;
- student/teacher ratio for each scientific area.

In addition, the formula contains cohesion factors (maximum and minimum limits to the budget variation relative to the previous year) to ensure that no institution will be faced with excessive budget cuts, although it may attenuate the effects of the quality parameters.

Table 2.21 – Criteria used in the Funding Formula developed for 2006

Terms in the new funding formula	Description
Overall number of students	Number of students for all the courses approved for public funding
Cost factor to allow considering specific institutional characteristics, as well as to differentiate areas of study	Staff average costs (indirect measure of qualification)
	Teacher/student ratios
	Teacher/non academic staff ratios
	Funding depends on reference costs calculated using the same criteria for every institution, using a predefined relationship between other current expenses and personnel costs (15/85)
Quality indicators	Level of the academic staff qualification (fraction of the academic staff holding PhDs)
	Graduation efficiency rate
	Post-graduation efficiency rates (masters and PhDs awarded)

The formula to distribute public basic funding for higher education institutions since 2006 is as follows:

$$OT_j = \sum_i [I_{ij} * F_{ij} * E_j * Q_j] * D$$

Where

- OT_j = Public basic funding level for higher education institution j
 I_{ij} = Student enrolments estimate in study area i of institution j
 F_{ij} = Cost factor for study area i in institution j
 E_j = Graduation efficiency for initial training students in institution j
 Q_j = Scientific efficiency for advanced training students in institution j
 D = Faculty members qualification level in institution j
 D = Theoretical national minimum funding level constant

Table 2.22 quantifies the final application of the formula and the level of funding for each institution in 2006, which was obtained after applying the inter-institutional cohesion factor that limits the annual funding level variation to the interval [-2%; + 5%]. It shows that the overall level of basic funding per student (social support to be added) is about 4,022 € for initial graduate programmes, with values varying between 4,403 € for universities and 3,383 € for polytechnics.

Figure 2.10 quantifies the evolution of the total basic funding distributed among public universities and polytechnics, as well as the level of the increase in the basic funding per student achieved during recent years.

Figure 2.10 – Overall basic public funding and basic funding per student distributed through funding formula to public institutions (initial training)

Source: GEFES and OCES

Post-graduate programmes have been funded above the average level for initial training, with funding per student around 4,883 € some 20% higher than typical values for graduate programmes. In this respect, it should be noted that (in contrast with graduate programmes) public universities have been allowed to ask for additional tuition fees for post-graduate education, without any limitation. This has been made clear through the recently established legal framework that introduced the Bologna Process in Portugal (i.e., Decree-Law 74/06, of 24 March).

Table 2.22 – Public basic funding for higher education public institutions as determined through a funding formula for 2006 (excludes social support and investments)

Institution	Initial Training Programmes			Advanced Programmes (Post-graduate)			Total Funding (€)
	Funding (€)	Students ('Licenciatura' and 'Bacharelato')	Funding per Student (€)	Funding (€)	Students ('Mestrado' and 'Pós-Licenciatura')	Funding per Student (€)	
U.ALGARVE	32 394 085	8 380	3 866	2 111 597	446	4 735	34 505 682
U.AVEIRO	40 676 369	10 288	3 954	3 400 479	703	4 837	44 076 848
U.B.I.	20 346 689	5 096	3 993	455 877	113	4 034	20 802 566
U.COIMBRA	79 029 579	17 389	4 545	5 031 024	948	5 307	84 060 603
U. EVORA	29 104 132	7 033	4 138	2 610 929	620	4 211	31 715 061
U.LISBOA	78 522 377	16 791	4 676	8 608 979	1 774	4 853	87 131 356
U.MINHO	56 614 073	13 796	4 104	4 337 137	896	4 841	60 951 210
U.N.L.	53 661 107	12 338	4 349	5 568 487	1 201	4 637	59 229 594
U.T.L.	87 657 487	18 493	4 740	11 652 698	2 117	5 504	99 310 185
U.PORTO	108 064 395	21 839	4 948	13 227 730	2 356	5 614	121 292 125
U.T.A.D.	28 270 929	6 322	4 472	876 537	171	5 126	29 147 466
I.S.C.T.E.	14 212 147	5 109	2 782	1 407 269	408	3 449	15 619 416

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U.AÇORES	13 830 580	2 731	5 064	916 449	176	5 207	14 747 029
U.MADEIRA	9 736.517	2 484	3 920	604 076	139	4 346	10 340 593
TOTAL UNIVERSITIES	651.963.745	148 089	4 403	60 965 989	12 068	5 052	712 929 734
IP BEJA	11 872 337	2 965	4 004				11 872 337
IP BRAGANÇA	17 427 958	5 098	3 419				17 427 958
IP C.BRANCO	16 128 549	4 298	3 753	138 471	25	5 539	16 267 020
IP CAV E AVE	2 804 546	1 465	1 914				2 804 546
IP COIMBRA	28 722 800	8 846	3 247				28 722 800
IP GUARDA	11 885 396	3 212	3 700				11 885 396
IP LEIRIA	22 784 204	8 847	2 575				22 784 204
IP LISBOA	46 864 246	13 482	3 476				46 864 246
IP PORTALEGR.	9 262 527	2 962	3 127				9 262 527
IP PORTO	46 267 794	14 907	3 104				46 267 794
IP SANTAREM	12 812 994	3 517	3 643				12 812 994
IP TOMAR	9 320 814	3 101	3 006				9 320 814
IP SETUBAL	18 509 090	5 506	3 362				18 509 090
IP V.CASTELO	10 552 540	2 852	3 700				10 552 540
IP VISEU	18 271 489	5 770	3 167	310 880	60	5 181	18 582 369
ESUP HOT. TUR. ESTORIL	2 482 334	1 072	2 316				2 482 334
ESUP ENF BISS. BARRETO	3 931 022	714	5 506				3 931 022
ESUP ENF DR. ÂNG FONSECA	4 544 372	714	6 365				4 544 372
ESUP ENF ARTUR RAVARA	1 876 764	288	6 517				1 876 764
ESUP ENF Mª Fª RESENDE	2 329 869	290	8 034				2 329 869
ESUP ENF FRANC. GENTIL	1 874 588	238	7 876				1 874 588
ESUP ENF CAL GULB. LISBOA	2 927 951	384	7 625				2 927 951
ESUP ENF CIDADE PORTO	1 633 603	181	9 025				1 633 603
ESUP ENF SÃO JOÃO	2 588 813	522	4 959	158 667	29	5 471	2 747 480
ESUP ENF D. ANA GUEDES	1 832 684	265	6 916				1 832 684
TOTAL POLYTECHNICS	309 505 021	91 496	3 383	612 281	114	5 371	310 117 302
TOTAL	963 559 068	239 585	4 022	59 487 968	12 182	4 883	1 023 047 036

Contractual funding with institutions was established under the current funding law of higher education through specific contracts. It represented public funding above the basic funding for higher education (as determined through a funding formula) and the contracts established in recent past are quantified in Tables 2.23 and 2.24, respectively for specific “contract-programmes” and for new buildings through “development contracts”.

Table 2.23 – Overall contractual funding with institutions of higher education in recent years as established through “Contract-Programmes” funded by the State Budget

(Euros)

Public Higher Education System	2004	2005	2006	2007	Total
Universities*	5.076.985	6.383.664	6.442.617	7.448.334	25.351.600
Polytechnics	4062538	3027901	2584499	1196062	10.871.000
Total	9.139.523	9.411.565	9.027.116	8.644.396	36.222.600

* Includes one contract with the Portuguese Catholic University (Private)

Table 2.24 – Overall contractual funding with institutions of higher education as established through “Development Contracts”, funded by the State Budget and FEDER (only partly spent, as by April 2006)

Higher Education Institutions	Period	Funding (€)	
		PIDDAC+EU	Public Budget
Universidade do Minho	2000-03	20.674.000	
Universidade da Beira Interior	started 2000	20.674.000	
Universidade de Lisboa	2002-06	21.024.000	289.300
Universidade de Nova de Lisboa	2002-06	17.870.000	239.423
Universidade de Coimbra	2002-06	33.638.000	224.459
Universidade do Porto	2002-06	37.842.000	319.230
Universidade Técnica de Lisboa - IST	2005-10	14.000.000	
Instituto Politécnico de Beja	2005-10	12.289.305	
Universidade Politécnico de Castelo Branco	2004-10	16.487.034	

Until 2005 funding of the social support services had been based on expenses from the previous year, a form of historical record, through the direct funding of public institutions (public universities and polytechnics) and of students in private institutions. It accounted for: i) direct funding to students (i.e., social support of individual grants); and ii) indirect funding to students (i.e., meals, accommodation, sports, health care), as quantified in Table 2.25.

Table 2.25 – Direct funding of social support services, 2000-2006 (Unit: €)

Higher Education System	2000	2001	2002	2003	2004	2005	2006
Funding to Public Institutions	94.475.744	97.536.477	102.963.308	102.963.308	117.824.068	132.728.745	127.710.100
Funding to Private Institutions	25.830.055	27.433.884	29.429.076	27.430.059	27.000.000	27.000.000	27.000.000
Total (1+2)	120.305.799	124.970.361	132.392.384	130.393.367	144.824.068	159.728.745	154.710.100

NOTE: Does not include other sources of private income and public investments for infrastructure and equipment.

Source: DGES

Since the 2006 annual budget, the direct funding of social support services of public institutions has been defined through a funding formula, that is based on two calculation elements:

- the service level of each support service, measured through the number and average cost of scholarships, meals and occupied places in student residences registered in the previous year;

- the efficiency of each support service, measured as the percentage of the total value of direct grants given to students relative to the global service expenditure.

The social service budget (O_{xi}) for each social service (i), for each year (x), as presented in Table 2.26 was determined as a fraction of the total available budget (OT):

$$O_{xi} = [O_{xi-1} / \sum_i O_{xi-1}] * OT$$

where O_{xi-1} is the budget of the previous year, weighted by the efficiency of the social service:

$$O_{xi-1} = (O_{1xi-1} + O_{2xi-1} + O_{3xi-1} + O_{4xi-1} + O_{5xi-1}) * E_i$$

where

O_{xi-1} = Funding level for social service i in the previous year

O_{1xi-1} = Amount expended in scholarships

O_{2xi-1} = Amount expended in social meals (number and average cost of meals served)

O_{3xi-1} = Amount related to the student residence vacancies occupation level

O_{4xi-1} = Amount for sports, cultural activities and health services

O_{5xi-1} = Amount expended in functioning costs (service structure costs)

E_i = Service efficiency measured as the percentage of the total value of direct support grants given to students relative to the service global expenditure

Table 2.26 shows that direct funding of social support services accounts for 455 € per student, in overall terms, representing about 9% of the basic funding per student. The survey conducted by Eurostudent 2005 confirmed that although polytechnics enrol students with comparatively higher financial needs, their social support system were funded at lower levels than those of universities. Table 2.26 quantifies these differences and shows that, on average, direct funding of social support services accounts for 485 € per university student, and only for 401 € per polytechnic student. These discrepancies have justified the new funding methodology and the formula introduced in 2006, which will help attenuate the funding differences among social support systems in university and polytechnic sub-systems.

Table 2.26 – Public funding of social support services of public higher education institutions in 2006, as determined through the funding formula (Unit: €)

Institutions	2005	2006		
	Final Funding (€)	Direct application of formula (€)	Final funding after application of institutional cohesion factor (€)	Funding per overall number of students (€)
UNIV. AÇORES	2 361 250	1 663 483	2 314 025	837
UNIV. ALGARVE	2 935 936	2 274 402	2 877 217	344
UNIV. AVEIRO	4 707 008	4 468 348	4 612 868	419
UNIV. B. INTERIOR	3 463 497	3 801 414	3 546 346	684
UNIV. COIMBRA	12 313 934	8 298 823	12 067 655	657
UNIV. ÉVORA	3 027 644	3 065 120	3 065 120	395
UNIV. LISBOA	8 400 748	6 209 916	8 232 733	438
UNIV. MADEIRA	1 785 354	1 871 989	1 828 061	696
UNIV. MINHO	8 638 472	10 213 309	8 845 109	613
UNIV. NOVA LISBOA	3 884 844	3 134 582	3 807 147	284

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UNIV. PORTO	10 043 897	7 330 043	9 843 019	407
UNIV. T.LISBOA	9 356 004	7 602 403	9 168 884	446
U.T.M.A. DOURO	4 451 314	3 889 828	4 362 288	713
TOTAL UNIVERSITIES	75 369 902	63 823 660	74 570 472	485
IP BEJA	1 547 402	2 135 174	1 584 417	538
IP BRAGANÇA	2 908 698	4 175 433	2 978 276	592
IP C. BRANCO	2 241 453	3 478 110	2 295 070	529
IP COIMBRA	3 097 601	4 035 034	3 171 697	367
IP GUARDA	1 617 899	2 305 985	1 656 600	517
IP LEIRIA	3 278 990	4 809 247	3 357 425	395
IP LISBOA	2 959 266	3 625 684	3 030 053	222
IP PORTALEGRE	1 737 722	2 187 565	1 779 289	541
IP PORTO	2 607 125	3 221 653	2 669 489	183
IP SANTARÉM	1 904 952	2 288 344	1 950 520	549
IP SETÚBAL	2 493 636	3 570 610	2 553 285	438
IP TOMAR	1 989 620	2 505 998	2 037 213	645
IP V. CASTELO	1 570 164	2 210 209	1 607 723	555
IP VISEU	3 465 670	4 417 395	3 548 571	622
TOTAL POLYTECHNICS	33 420 198	44 966 440	34 219 628	401
TOTAL	108 790 100	108 790 100	108 790 100	455

Source: DGESUP

Table 2.27 quantifies the type of support through the budget devoted to social support services and shows that direct student support through scholarships accounted only for about 53% of the overall budget. Again, the funding methodology adopted in 2006 aims to increase that value by rewarding those services that maximise the direct support to students.

Table 2.27 – Allocation of the state budget for social support services in 2006

Type of Expenses	Funding (€)	% / Total
1. Current Expenses	108.686.100	85,1%
(a) Personnel	33.800.172	26,5%
(a) Student Grants	67.788.505	53,1%
(b) Other Expenses	7.097.423	5,6%
2. Capital Expenses	104.000	0,1%
3. Nursing and Health Technologies Schools	3.280.681	2,6%
4. Common Endowments	15.639.319	12,2%
Total Funding to Public Institutions (1+2+3+4)	127.710.100	100,0%

Public funding for science and technology, S&T, in higher education

Tables 2.28 and 2.29 provide a general picture of the funding level for science and technology in Portugal when compared internationally. Gross expenditure in R&D has increased steadily since 1995 from 0.57% of GDP to 0.85% of GDP in 2001, but decreased since then to 0.78% of GDP in 2003.

Table 2.28 – Total expenditure in R&D, 1982-2003

Year	Current prices	Constant prices ¹	t.m.c.a. ²	PPCC ³	GERD/GDP
	1 000 €	1 000 €	%	(Millions US\$)	%
1982	32 627.4	196 745.5	-	185.3	0.30
1984	56 402.1	218 927.1	5.5	222.4	0.34
1986	99 099.2	262 331.1	9.5	280.8	0.38
1988	149 194.4	322 691.9	10.9	367.1	0.41
1990	259 535.5	448 933.2	17.9	550.6	0.51
1992	401 022.5	565 400.6	12.2	734.2	0.61
1995	460 037.1	544 404.2	-1.3	753.5	0.57
1997	576 882.9	638 583.2	8.3	907.6	0.62
1999	814 746.7	842 966.2	14.9	1 255.1	0.75
2001	1 038 431.7	995 909.8	8.7	1 578.4	0.85
2003	1 019 581.0	911 467.1	-4.3	1 527.3	0.78

Notes: 1 GDP Implicit deflators (2000=1), Main Science and Technology Indicators, OECD, 2005(1) - Database; 2 Average yearly growth rate at constant prices; 3 PPPs at constant prices, OECD (*ibid*); 4 GDP values published by OECD (*ibid*).

Government expenditure accounts for more than 60% of the overall expenditure in R&D in Portugal, while the average European value is below 35%. On the other hand, private expenditure in R&D in the European Union accounts for almost 55% of the overall expenditure, whereas it is only 32% in Portugal.

Table 2.29 – Gross domestic expenditure on R&D (GERD) by source of funds (%)

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Government	EU15			36.8 ^s	35.9 ^s	35.5 ^s	34.1 ^s	33.8 ^s	33.7 ^s	33.7 ^s	34.7 ^s
	Portugal	59.4 ^e	65.3	66.9 ^e	68.2	69.1 ^e	69.7	64.8 ^e	61	60.5 ^e	60.1
Industry	EU15			53.4 ^s	53.6 ^s	54.2 ^s	55.5 ^s	55.5 ^s	55.6 ^s	55.3 ^s	54.6 ^s
	Portugal	20.2 ^e	19.5	20.5 ^e	21.2	21.3	21.3	27.1	31.5	31.6 ^e	31.7
Abroad	EU15			7.7 ^s	8.2 ^s	8.2 ^s	8.2 ^s	8.4 ^s	8.5 ^s	8.7 ^s	8.5 ^s
	Portugal	15.0 ^e	11.9 ^b	8.7 ^e	6.1 ^b	5.7	5.3	5.2	5.1	5 ^e	5

s – EUROSTAT estimate; e – Estimated value; b – Break in series; Source: EUROSTAT, 2005

Table 2.30 presents the evolution of the total expenditure in R&D at constant and current prices and shows that higher education institutions represent the largest share of the expenditure in R&D. Since most non-profit institutions are also associated to universities, analysis shows that higher education represents almost 50% of the total expenditure in R&D.

Table 2.30 – Expenditure in R&D for each sector, at constant prices¹ (1990-2003)

Sector	1990		1995		1999		2003	
	1 000 €	%	1 000 €	%	1 000 €	%	1 000 €	%
Industry	117 216	26.1	113 875	20.9	191 197	22.7	302 193	33.2
Government*	114 236	25.4	147 111	27.0	235 557	27.9	153 802	16.9
Higher Education	161 757	36.0	201 683	37.0	325 252	38.6	350 252	38.4
Private Non-Profit institutions**	55 723	12.4	81 733	15.0	90 958	10.8	105 219	11.5
Total	448 933	100.0	544 404	100.0	842 966	100.0	911 467	100.0

¹ GDP Implicit deflators (2000=1), Main Science and Technology Indicators, OECD, 2005(1) – Database

*Excluding higher education. **Many associated to universities. Sources: OCES, Inquérito ao Potencial Científico e Tecnológico Nacional; OECD, Main Science and Technology Indicators, 2005(1) – Database

Two main basic public funding categories for S&T have been implemented in Portugal since 1996:

- Core funding, which corresponds to a specific allocation to R&D Centers and S&T institutions (most of them at public universities) by the Portuguese Science and Technology Foundation, FCT, based on periodic evaluations (every 3 years), including two components:
 - basic funding in terms of number of researchers and level of evaluation;
 - programmatic funding, for specific actions to be defined by evaluators.
- Competitive funding, which comprises other funds, including:
 - individual scholarships and advanced training of human resources;
 - research and development projects;
 - prizes;
 - other funds, including funding and cooperation models.

The analysis of the international evaluations of S&T implemented since 1996 (Heitor 2000), raises the fundamental question that needs to be analysed in the context of S&T funding in Portugal. What is the structure and form that these two funding types should follow in order to consolidate the autonomy of scientific institutions, and their sustainable development regardless of external alterations to the development of science itself? At present, while public-based funding (core funding) is only dependent on the scientific evaluation of activities carried out, bearing in mind the size of R&D units, additional funding is attributed on a competitive basis, to be carried out through public tender calls.

The international evaluation reports have also explicitly acknowledge that the adoption of the “research university” model by most public universities depends, above all, on the integration of teaching and research activities. This process is known to have achieved an international scale and relevance through the enhancement of post-graduate activities, associated with a gradual process of institutional diversity. However, the number of post-graduate students in proportion to the overall number of students in the most research intensive schools in Portugal is below 20%, whereas for most European and American “research universities” this figure is above 40%, achieving a maximum of 60% at the Massachusetts Institute of Technology (Figure 2.11). In fact, the link between research and education has been explicitly

recognised in the different international evaluations carried out by FCT as a priority for scientific development.

Figure 2.11 shows that the high number of post-graduate students is associated with highly competitive based funding schemes devoted to research activities, indicating that these students are important to form essential critical masses for the accomplishment of research activities in a framework of competitive R&D funding.

Figure 2.12 compares the financial resources allocated to sample Portuguese, European and American universities, quantifying to a certain extent the under funding level of S&T activities, which has thwarted research activities in Portugal. In comparison with well considered universities worldwide (namely intensive research universities⁶ and master colleges/universities⁷, according to the Carnegie Classification), the analysis shows that the total budget of a typical Portuguese University (i.e., the Technical University of Lisbon, UTL) is about 20% of the overall budget of the extensive research universities⁸ with a smaller budget, such as Georgia Institute of Technology and University of Maryland Baltimore. Considering only European universities, it can be concluded that the UTL overall budget is three times smaller than that of the University of Karlsruhe (German university with the smallest budget) and half the overall budget of Trinity College, Ireland.

⁶ These institutions offer a wide variety of undergraduate programmes, and give emphasis to post-graduate education, through doctoral programmes. In general, at least ten PhD diplomas are awarded in three or more courses, or a total of 20 PhD awards every year.

⁷ These institutions offer a wide variety of undergraduate programmes, and give emphasis to post-graduate education, through Master's programmes. In general, at least forty Master's diplomas are awarded every year, in three or more courses.

⁸ These institutions offer a wide variety of undergraduate programmes, and give emphasis to post-graduate education, through doctoral programmes. In general, at least fifty PhD diplomas are awarded every year in, at least, 15 courses.

Figure 2.11 – Comparison between Portuguese, European and American universities regarding the competitive funding weight and the relative fraction of post-graduate students

Source: UTL (2005), "Knowledge production and diffusion at the Universidade Tecnica de Lisboa 1995/96-2002/03", UTL.

Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; (7) Central Connecticut State University; **(8) Technical University of Lisbon**; (9) Cumberland University; (10) University of Arizona; (11) Colorado State University; (12) Georgia Institute Technology; (13) University of Maryland Baltimore; (14) Portland State University; (15) Arkansas State University.

Note 2: 2003 data: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; 2002 data: all other universities; According to Carnegie Classification, in this figure, 11 research universities are presented and 3 master universities (American universities)

Note 3: Information from the Technical University of Lisbon are only related to the Instituto Superior Técnico

Sources: Annual reports, requests for information to universities

Figure 2.12 – Comparison between the level of funding in Portuguese, European and American universities in terms of volume of the overall budget of universities and the funding weight allocated to R&D on a competitive basis

Source: UTL(2005), "Knowledge production and diffusion at the Universidade Tecnica de Lisboa 1995/96-2002/03", UTL.

Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; (7) Central Connecticut State University; **(8) Technical University of Lisbon**; (9) Cumberland University; (10) University of Arizona; (11) Colorado State University; (12) Georgia Institute of Technology; (13) University of Maryland Baltimore; (14) Portland State University; (15) Arkansas State University; (16) Trinity College; (17) U Karlsruhe; (18) U Erlangen-Nürnberg; (19) TU Berlin; (20) U Frankfurt a.M.; (21) TH Aachen

Note 2: 2003 data: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; 2002 data: all other characteristics; According to Carnegie Classification, this figure shows 11 research universities and 3 master universities (American universities)

Note 3: In the absence of other information, the UTL data only refer to the Instituto Superior Técnico

The funding differences identified have, naturally, an impact on teaching and research results, and are an element that distinguishes Portuguese universities on an international scale. In terms of teaching, because a larger funding effort allows students to be provided with more resources to support learning, more professors and support staff can be hired, and more infrastructures can be created and maintained in order to improve the quality of teaching programmes. As for research, it allows professors, researchers, technicians and administrative staff to be recruited, and makes it possible to acquire and maintain laboratory and research material, thus providing the institution with larger capacity to capture and maintain post-graduate students. Thus, Figure 2.13 shows that in comparison with MIT of Boston and Carnegie Mellon of Pittsburgh, the competitive funding per professor in a typical Portuguese university is, respectively, about sixteen and six times smaller. In turn, the funding per student in Portuguese universities is at least ten times smaller than in those universities

Figure 2.13 – Comparison of the degree of competitive funding per professor and funding per student between Portuguese and American universities

Source: UTL (2005), "Knowledge production and diffusion at the Universidade Tecnica de Lisboa 1995/96-2002/03", UTL.

Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; (7) Central Connecticut State University; (8) **Technical University of Lisbon**; (9) Cumberland University; (10) University of Maryland Baltimore; (11) Portland State University; (12) Arkansas State University.

Note 2: 2003 data: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; 2002 data: all other universities; According to Carnegie Classification, this figure shows 11 research universities and 3 master universities (American universities)

Note 3: In the absence of other information, the UTL data refers only to the Instituto Superior Técnico

Public funding for infrastructures in higher education (i.e., buildings and equipment)

Public support for infrastructures in higher education has considered investments in new buildings and equipment over the last three decades, with major investment made since 1990, as quantified in Figure 2.14. The institutions have negotiated individually with the Government, through DGES, their own development plans, which resulted in a considerable extension of physical infrastructures throughout the country. Table 2.31 shows that the overall public investment, over 15 years, per current student was about 4 647 €

Figure 2.14 – Evolution of public investment for buildings and equipments in higher education (€ for 1990 - 2004 (i.e., PIDDAC; includes national funds, FN, and European structural funds, FE)

Source: GEFCEs

Table 2.31 – Overall public investment in buildings and equipments in higher education (€ for 1990 – 2004

Sub-system	Contribution from the State budget (1990-2004) (1)	European Structural Funds (1990-2004) (2)	Total funding (1990-2004) (3) = (1)+(2)	Total funding per student* (1990-2004) (4)
Universities	689 632 925	207 699 698	897 332 623	5 162
Polytechnics	236 503 279	104 755 595	341 258 874	3 881
Nursing schools	26 508 140	0	26 508 140	2 525
Total	952 644 344	312 455 293	265 099 637	4 647

* number of students calculated in December 2004. Source: GEFCEs

Public funding for the diffusion of information and communication technologies, ICTs

In addition to public funding for teaching and research activities, public support of higher education institutions also considered the support for the diffusion of information and communication technologies, including the promotion of “e-learning” and the establishment of “virtual campus”, as quantified in Table 2.32.

“Virtual campus” is an initiative aiming at the creation and development of Services, Contents, Applications and Mobile Communications Networks (inside and outside University) for students and teachers of higher education, inciting and easing the production, access and share of knowledge. Various integrated projects were supported since 2003, including wireless connectivities (WIFI networks) and new contents (teaching and academic services) aiming at:

- the creation of educational contexts enabling teachers and students to use means and tools of the information society in order to improve the quality and effectiveness of educational system;
- the creation of didactic contents supported by multidisciplinary educational programmes, including collaboration activities between agents of the educational system.

Table 2.32 – Public funding for the establishment of “virtual campus” in Portugal

Higher Education System	1st phase (2003-2006)		2nd phase (2004-2006)		Total	
	Nr. of projects	Funding (€)	Nr. of projects	Funding (€)	Nr. of projects	Funding (€)
Universities	10	9.874.098	4	3.656.181	14	13.530.278
Politechnics	10	5.413.939	7	3.469.174	17	8.883.113
Private Institutions	11	4.424.669	21	5.584.149	32	10.008.818
Total	31	19.712.706	32	12.709.504	63	32.422.210

Source: UMIC, Agency for Knowledge Society

Evolution of the main categories of income

The evolution of the funds available for the public sub-system indicates different trends according to the source considered. During the expansion phase of the 90's there was a clear increase in the funds transferred to public universities from the public budget. From 2001 to 2004 the increase in enrolments has slowed down and there was an average annual increase of the overall budget equal to 3.39% (Table 2.33) at current prices. It can be observed that public funds for investment decreased on average 5.37% over the same period. Indeed, due to the large investments in infrastructures over the last decades and the decreasing number of candidates to higher education, it is possible that the existing physical capacity be already under utilised.

Table 2.33 – The annual rate of change of the budget of public higher education institutions

Income – annual variation rate (%)					
	Public budget	Fees	Earned income	Investment	Total
2001-02	3.64	11.80	6.55	-0.30	4.46
2002-03	0.42	8.46	-0.28	1.17	0.85
2003-04	-1.77	44.59	18.26	-16.99	4.87
Average	0.76	21.62	8.18	-5.37	3.39

Source: GEFCEs, MCTES, 2005

Table 2.33 also shows an increase in the revenues from tuition fees (average of 21.62% over the 2001-04 period), which was due to the increase in the absolute value of fees. Besides tuition fees, institutions have other sources of revenue (earned income), including the transfer of accumulated net balances and EU funds, which had an average increase of 8.18% over the same period.

Table 2.34 refers to the annual net balance of public higher education institutions, which presents an annual rate of change equal to 26.13%, despite the apparent economic difficulties claimed by some institutions. Occasionally, the Ministry of Finance has frozen these net balances, due to the EU restrictions to the national budget public deficit.

Table 2.34. The annual rate of change of the net balance of public higher education institutions

Net balance - annual variation rate (%)	
2001-2002	50.06
2002-2003	20.63
2003-2004	7.69
Average rate	26.13

Source: GEFCEs, 2005

Table 2.35 presents the average composition of the income budget of public higher education institutions and quantifies the dominant role of public funding. Despite a slow steady decrease, the combined effect of public funds for current expenses and for investment still represented 64% in 2004 (compared with 71 % in 2001).

Table 2.35. The average relative weight of different types of income

Percentage of total income					
	Public budget	Tuition Fees	Earned income	Investment	Total
2001	61.69	6.14	23.15	9.02	100.00
2002	61.20	6.58	23.61	8.61	100.00
2003	60.95	7.07	23.35	8.64	100.00
2004	57.09	9.75	26.32	6.84	100.00
Average	60,23	7.39	24.11	8.28	100.00

Source: GEFCEs, 2005

The second major source of funding is earned income (without tuition fees) and it also expanded throughout the last years. This funding source acquired a more prominent role in recent years and often contributed with about a quarter of the funds to many institutions, though its importance achieved considerably higher values in the most intensive research schools, namely in the area of engineering.

The third source of funding is provided by student fees, which presented a clear growth pattern in nominal terms in recent years, especially due to the changes in the funding law in 1997 and 2003. Student fees clearly increased their role as a funding source in recent years, though they still represent less than 10% of overall income and, therefore, still play a small role for public higher education institutions when compared with other systems in Europe and the USA.

Law 37/2003 of 22 August determined that each institution decide upon the level of fees paid by students between a minimum and a maximum value, which were indexed to the minimum national salary (i.e., between €450 and €850 for academic year 2003-2004).

The results of the exercise for 2005-06 are presented in Tables 2.36 and 2.37, respectively for public universities and polytechnics, with current fees at most public universities at a value very close to the maximum limit of €902. The Universities of Algarve and Évora have set lower fees. Some schools within the University of Lisbon and of the New University of Lisbon set lower fees to meet agreements with the students' unions. The Universities of Madeira and Azores followed a non-aligned policy due to what is traditionally seen as the "costs of insularity". In general, fees in Polytechnics are lower than in Universities.

Public Universities are free to set the level of fees for postgraduate studies. In general those fees in 2005 averaged €1,820 (Table 2.38), the only exception being fees charged in areas of economics.

Table 2.36. Tuition fees for graduate programmes in public universities for 2006 (forecast)

Institution	Enrolments	Fees	Revenue
University of Algarve*	7 918	680	5 384 240
University of Aveiro*	10 305	900	9 274 500
UBI	5 072	850	4 311 200
University of Coimbra	17 406	901	15 682 806
University of Évora	7 147	799	5 710 453
University of Lisbon ¹	9 170	900	8 253 000
Fine Arts	1 220	800	976 000
Arts	4 106	530	2 176 180
Medicine	1 588	880	1 397 440
Psychology and Education	950	750	712 500
University of Minho	13 536	900	12 182 400
New University of Lisbon ²	9 170	900	8 253 000
Social Sciences and Humanities	2 975	620	1 844 500
Technical University of Lisbon	18 442	900	16 597 657
University of Porto	21 920	900	19 728 000
UTAD	5 945	880	5 231 600
University of Azores	2 590	700	1 813 000
University of Madeira	2 487	747	1 857 789
ISCTE	5 124	902	4 621 848

* also includes the polytechnic schools integrated in the university

¹ Schools of Sciences, Law, Dental Medicine and Pharmacy ² Schools of Medical Sciences, Economics, Science and Technology, Law, Statistics and Information Management. Source: GEFCEs, MCTES, 2005

Table 2.37. Tuition fees for graduate programmes in public polytechnics for 2006 (forecast)

Institution	Enrolments	Fees	Revenue
Beja ¹	2 639	487	1 285 193
School of Health	308	600	184 800
Bragança	5 027	487	2 448 149
Castelo Branco	4 309	487	2 098 483
Cávado e Ave	1 465	600	879 000
Coimbra ¹	2 529	550	1 390 950
Coimbra ²	3 127	500	1 563 500
Coimbra ³	2 981	487	1 451 747
Guarda	3 207	550	1 763 850
Leiria	8 508	700	5 955 600
Lisboa ⁴	2 392	675	1 614 600
School of Journalism	1 089	900	980 100
School of Dance	121	825	99 825
School of Education	867	680	589 560
S. Accountancy & Administration	2 581	660	1 703 460
School of Engineering	6 581	705	4 639 605
Porto	14 608	800	11 686 400
Santarém	3 550	700	2 485 000
Portalegre ⁵	2 768	487	1 348 016
School of Agriculture	255	600	153 000
School of Health	268	650	174 200
Tomar	3 159	680	2 148 120
Setúbal	5 835	850	4 959 750
Viana do Castelo	2 897	750	2 172 750
Viseu	5 649	700	3 954 300
Nursing schools			
Coimbra	1 448	487	705 176
Lisbon	1 177	903	1 062 831
Porto	962	900	865 800

¹ Agriculture and Education ² Accountancy & Administration and Health

³ Engineering and Technology and Management ⁴ Theatre and Cinema, Music and Health

⁵ Education and Technology and Management

Source: GEFCEs, MCTES, 2005

Table 2.38. Sample survey of tuition fees for master degree programmes in public universities, 2005

University	Field of study	Tuition Fees (Euros)			Students enrolled
		1 st Year	2nd Year	Annual average	
Technical University of Lisbon, UTL	Sciences & Engineering	2000	2000	2000	2030
	Economy	5025	0	2513	
ISCTE	Social Sciences & Management	4670	520	2595	621
University of Minho		1375	1375	1375	732
University of Lisboa	Law	3140	0	1570	1830
	Sciences	1000	1000	1000	
	Humanities	1500	1500	1500	
University of Porto	Engineering	1480	1480	1480	2358
	Economy	2960	325	1642	
University of Aveiro	Arts, Sciences & Engineering	2250	2250	2250	559
	Economy & Management	1875	1875	1875	
	Maths & Education	1875	1875	1875	
	Social Sciences	1500	1500	1500	
New University of Lisbon, UNL	Economy	15000	-	15000	1263
	Health Sciences	2500	2500	2500	
	Social Sciences	1250	1250	1250	
	Sciences & Engineering	1540	1540	1540	
University of Coimbra	Sciences & Engineering	1150	1075	1113	1335
UBI	Sciences & Engineering	1575	1575	1575	206
	Social Sciences	1325	1325	1325	
University of Azores		2020	2020	2020	87

Evolution of the main categories of expenditure

The basic funding transferred by the government to public higher education institutions is given as a lump sum, calculated by a funding formula. Although institutions are autonomous to decide the internal distribution of funding, the largest share goes to staff salaries. Some institutions replicated internally the criteria defined in the national formula, whereas others made some adjustments. There are also some important differences in terms of the degree of financial autonomy enjoyed by schools/departments in each institution.

Table 2.39 presents the relative weight of the different categories of expenditure and Table 2.40 presents the annual rate of change of the different categories of expenditure. It can be seen that while personnel expenditures are still increasing, all the other expenditure categories are decreasing, especially the investment expenditures.

Table 2.39. The relative weight of different types of expenditure (public institutions)

Percentage of total expenditure						
	Personnel (1)	Others (2)	Current expenses (3) = (1) + (2)	Investments (4)	Net balance (5)	Total (6)
2001	54.67	28.42	83.09	6.52	10.39	100.00
2002	55.70	23.68	79.38	5.70	14.92	100.00
2003	56.39	21.53	77.91	4.24	17.85	100.00
2004	55.00	23.68	78.67	3.00	18.33	100.00
Average	55.44	24.33	79.76	4.87	15.37	100.00

Source: GEFCEs, 2005

Table 2.40. The annual rate of change of the expenditure categories

Expenditure - annual variation rate (%)				
	Personnel	Others	Investment	Total
2001-2002	6.41	-12.94	-8,74	4.46
2002-2003	2.10	-8.33	-25,02	0.85
2003-2004	2.29	15.34	-25,78	4.87
Average rate	3.60	-1.98	-19,84	3.39

Source: GEFCEs, 2005

The increase in personnel expenditure is not so much due to changing the ratio between staff and students, but rather to the improvement of the qualifications of the teaching staff. Until recently most Portuguese higher education institutions had a high portion of their academic staff in categories below the Professor level (i.e., without a doctorate degree). A large portion of academic staff completed Master and Doctorate degrees in recent years and this in general meant an automatic promotion in the academic hierarchy with consequences at financial level. This is confirmed by the fact that the institutions with the highest fraction of salary expenditures are precisely those with the highest qualifications in the academic staff (i.e., the oldest institutions).

5. Institutional autonomy and development, relationships with government and the management of human resources

From the perspective of emerging higher education policies worldwide, the need to preserve institutional integrity of the higher education system so as to foster institutional autonomy, has called for increased attention from governments, institutions and society at large. In this context, higher education institutions are considered as knowledge infrastructures where research and teaching activities should be guaranteed under diversified actions and policies, especially at a time where knowledge creation is increasingly important and societies are increasingly dominated by market-based economies. While this may seem like a platitude, in many countries, including Portugal, the social standing of research in universities is still undervalued in comparison with education. Portugal has quantitative shortcomings, but, at the same time, the country has been making progress, in a catching-up dynamic that has been documented. Reference is made to institutions in a broad sense and this includes the institutional framework for higher education relationships, namely with the state and with a broad social and economic fabric of actors. In particular, two main aspects should be mentioned: (i) a state-centred higher education system, lacking the potential for self reforming and behaving in a reactive way to top-down measures, which are very often driven by short-term political cycles; and (ii) limited participation of social and economic actors and limited industry-science networks.

Within the system of tertiary education, it should be noted that different sub-systems have diversified degrees of autonomy, as a result of their particular establishment throughout history. This is briefly described in this part of the report.

Public universities

The public university system includes 14 public universities (including the Open University) and a non-integrated university school, ISCTE. The University of Coimbra, the oldest university, was founded in 1290. The University of Évora was founded in 1559 through the Jesuits, but it was closed down in February 1759 when the Marquis of Pombal expelled the Jesuits from Portugal. Coimbra remained the only Portuguese university until 1911 when the monarchy was overthrown. The new Republican regime established two new universities in 1911, the University of Lisbon and the University of Porto. In 1930 the Technical University was created in Lisbon by integration of four already existing schools: Veterinary Medicine, Agronomy, Engineering (i.e., Instituto Superior Técnico, IST) and the Institute for Economy and Management.

Forty years later, in 1973, the University of Aveiro, the University of Minho and the New University of Lisbon were established while a University Institute was created in Évora and two Polytechnic Institutes were created at Vila Real and Covilhã. In 1976 the University of Azores was created, and in 1979 the University of Algarve was established, while the Évora University Institute was transformed into a university. In 1986 the Polytechnic Institutes of Vila Real and Covilhã were transformed respectively into the University of Trás-os-Montes and Alto Douro (UTAD) and the University of Beira Interior (UBI). In 1988 the University of Madeira was created, as well as the University Aberta – an Open University for long-distance education.

The autonomy of public universities is sanctioned by the Constitution and the University Autonomy Act (Law 108/88), which confers public universities a high degree of autonomy, including pedagogical, scientific and financial autonomy. In addition, all buildings have been transferred to the ownership of the institutions. Public universities receive public funds as a line budget that can be altered by decision of the rector. Earned income (including tuition fees) and net balances are considered assets of the university that the institution can use at its own discretion.

Portuguese public universities are usually considered as State's indirect administration, as argued by specialists on administrative law (Amaral, D.F., 1999), although other legal experts have argued in favour of considering public universities as autonomous public administration (e.g., Sousa, 1999).

Each University has the right to elaborate its statutes, provided it complies with the applicable legislation. The statutes must define the organic structure of the University, the norms for its internal organisation on the scientific, pedagogic, financial and administrative levels of activity, and the autonomies of its units.

Public services are established by Portuguese law, meaning that the number of civil servants is also determined by law, which restricts the number of staff that can be hired on a permanent basis. Increasing staff numbers requires authorisation from the Ministry of Finances, which has been difficult to obtain, namely in periods of financial stringency.

For public higher education institutions, the academic, administrative and technical staff (full professor, associated professor, administrator, etc.) is also fixed by law. Although public universities have to keep constant the total number of staff, they may change its relative composition, while the total number of staff is reviewed every two years depending on student enrolments. (116 e 117 não traduzem a realidade e não chamam a atenção para a situação de menoridade dos politécnicos – relacionar com 141; por outro lado não mostram bem que as universidades gozam de algumas vantagens em relação aos outros services públicos).

Article 7 of the University Autonomy Act grants public universities full pedagogic autonomy, meaning that:

- In compliance with their pedagogic autonomy and in harmony with national policies of education, science and culture, universities shall have the right to create, suspend and cancel courses;
- Universities are autonomous in matters of designing study programmes and subject contents, defining educational methods, selecting methods of evaluating knowledge and trying new pedagogical experiments;
- Universities shall guarantee the plurality of doctrines and methods upholding the freedom in teaching and learning.

In practice, this means public universities have almost complete freedom to start, suspend or cancel courses and they have used this capacity quite extensively. It is true that DGES must register new degrees, but registration can only be denied if the degrees are illegal (for instance because of duration or number of credits). The only possibility open to Government to regulate the public university system is through funding rules or by controlling enrolments when defining the *numeri clausi*.

The governing bodies of the universities are strictly defined by law. They are the University Assembly (it approves the statutes and elects the Rector), the Rector (uninominal executive body), the University Senate (policy and legislative body) and the Administrative Council (for the current financial administration). The statutes may create other bodies that share functions from the Senate or the Administrative Council and under this provision some Universities have created Scientific or Academic Councils to coordinate the scientific-pedagogic policies of the University. Advisory Committees may also be foreseen in the statutes, both for the University and its constituent units.

The responsibilities of the collegiate bodies are defined by law. Their composition is defined in the statutes, under narrow limits set for participation of ex-officio members and for the number of elected representatives from the professors, other academic staff, students and non-academic staff, parity between the numbers of elected academic staff and students and balance in the representation of the units regardless of their dimension.

The governance of university's units (Faculties, Schools, Institutes or, in some cases, Departments) include the Assembly of Representatives, the Directive Council, the Pedagogic Council and the Scientific Council (or a Pedagogical-Scientific Council). The law does not preclude the existence of a Dean, but the most frequent situation is having different Presidents for the several bodies (the unit is then represented by the President of the Directive Council), which may lead to conflict due to some overlap of competences.

The provisions on the composition of the governing bodies have raised several aspects of concern in recent years, such as:

- The lack of external orientation and advice, but above all of accountability facing external bodies. The autonomy law does not allow for external participation in the University Assembly, which elects the Rector from within the full professors of the University, in the form of an internal process. External participation in the Administrative Council is also inexistent;
- The limited role of pedagogical councils and the related passive participation of students, namely in educational/ pedagogical planning and supervision;
- The large dimension of most of the collegiate bodies (Simão *et al.* 2002): the number of members of the University Assembly in the 14 Public Universities in 2002 varied between 64 and 331, while the number of members of University Senates ranged from 36 to 179;
- The predominance of the collegiate approach in the university management leading to slow and cumbersome decision-making processes and a diffusion of personal responsibilities. Decision making tends to be corporative, lacking clarity and transparency, which does not contribute to the necessary institutional cohesion.
- Leadership is not favoured and strategic planning is not a common tool for institutional development.

University Senates may have external participation. Up to 15% of its composition may be external members, when it is foreseen in the statutes and they are nominated by the Rector, or by the Senate following a proposal from the Rector. The data available for 2002 (Simão *et al.*, 2002: 422) shows that only half of the universities had external members in their Senates, ranging from 3% to 12%.

Most universities created "Advisory Committees" with participation of external members, but without decision capacity. In general such bodies meet seldom and have little influence in institutional strategies.

Public polytechnics

The idea of creating a polytechnic sector in Portugal can be traced back to the OECD's Mediterranean Regional Project, MRP, of 1959. This project aimed at assessing future needs for skilled labour in five Mediterranean countries (Italy, Greece, Spain, Yugoslavia and Portugal) and had a lasting impact in terms of the political and social perception of education, with significant effects on the educational structure of the participating countries. These changes included the expansion of the higher education network by

creating new university-level institutions, while a binary system was initiated through the establishment of polytechnic institutes and several colleges of teacher training (Parliament Act 5/73 of 25 July).

After 1974 the existing polytechnics were transformed into “University Institutes” under the allegation that they should not remain “second class” institutions. It was in this context that successive governments established contact with the World Bank and, from 1978 to 1984 about nineteen different missions visited Portugal. The Bank’s approach was based on two main principles:

- A basic emphasis on an economic approach to higher education to improve efficiency by attaining objectives at the lowest possible cost, e.g. containing long term university degrees while promoting shorter technical degrees, shorter teacher training degrees, higher student/staff ratios, etc.
- A perspective of a world division of labour that led to the definition of country specific roles.

Although the 1997 Progress report welcomed the expansion of higher education⁹ correcting the prior situation of unequal and limited access, the World Bank did not favour further expansion “... the enrolment represents 8% of the 18-22 age group and could be considered adequate. ... In view of the rapidly increased university enrolments, which represent an uneconomical drain in the economy...[the Bank recommends a] gradual introduction of quantitative restraints” (World Bank, 1977 Progress report). At the same time, the World Bank urged the Portuguese authorities to restrain enrolment quotas so as to make “better use” and rationalise the supply of higher education and improve the management of the system, namely in terms of accountability, coordination, and efficiency. Future expansions should be planned taking into account manpower needs, and demographic and enrolment trends. As for student/staff ratios, the Bank considered that they were too low: “...The student/teacher ratio of 6:1 was low... The average ratio set by Unesco, as a target for less developed countries is 15:1” (World Bank, 1977 Progress report).

Subsequently, the World Bank produced two “Staff Appraisal Reports”, which provided insights about the negotiations between the Bank’s Mission and the Portuguese government, and further confirmed the Bank’s priorities¹⁰ In the first Report of Assessment (No. 1807-PO, 1978), the Bank insisted on three criteria: balancing the supply of higher education graduates with the economic needs of the country, developing a persistent and consistent policy towards vocational education, and upgrading teacher training programs. The Bank suggested that Portugal needed not only to train high level technicians but also middle level personnel (on an yearly basis: 1400 technicians with short cycle post-secondary education, 500 agricultural technicians and 6000 middle level managers). Subsequently, the government passed Decree-Law 397/77 of 17 September, which established a numerus clausus for every study programme and thereby eliminated the threat to the new short vocational education programs.

The World Bank was critical of the erratic policies toward the existing technical institutes, and of the excessive enrolment in university engineering programmes and the lax approach on managing vacancies quotas, and raised the issue of diseconomies of scale in the system, suggesting that there were too many institutions with small dimension. The government replied to the Bank’s demands with Decree-Law 513-T/79¹¹, which established a network of polytechnic institutes, including Higher Schools of Education. The

⁹ Enrolments increased dramatically from about 57,000 in 1974-75 to 72,000 in 1975-76 (about 26%), corresponding to a change in participation rate from about 7.7% to 9.7%.

¹⁰ These priorities were the improvement of technical and management capacity of the higher education system, and the promotion of technical and vocational post-secondary education for those that the system had been unable to retain or to prepare conveniently for the labour market.

¹¹ This Decree-Law was later ratified by the Parliament with some changes – Law 29/80 of 28 July.

main objectives of Polytechnic education were to provide education with an applied and technical emphasis and strong vocational orientation, for training intermediate level technicians for industries, service companies and educational units (first cycle of basic education).

Under the Decree-Law 513-T/79, the curricular organisation of Polytechnic higher education was based on initial training programmes of three years providing a 'bacharel' degree. Higher Schools of Education were an exception because they could also confer a 'licenciatura' degree after a four-year programme allowing students to become teachers in the second cycle of basic schooling.

Decree-Law 513-T/79 created Polytechnics in several major cities (Beja, Bragança, Castelo Branco, Coimbra, Faro, Lisbon, Porto, Santarém, Setúbal and Viseu), a School of Management and Accountancy in Aveiro, a School of Technology in Tomar and Teacher Training Schools in Guarda, Leiria, Portalegre, Viana do Castelo and Vila Real. The Polytechnic of Faro was later integrated into the Universidade of Algarve. One year later, Decree-Law 303/80 of 16 August created new Polytechnics in Portalegre, Leiria, Guarda and Viana do Castelo, integrating the former Colleges of Teacher Training.

Following the World Bank's recommendations, it has been assumed that a vocationally oriented segment was an important strategic objective to promote student enrolment in scientific and technological and economic/business programmes that would provide intermediate level qualified human resources. Diversification and regionalisation of higher education was another political argument in favour of establishing the polytechnic network. It was assumed that this network should be able to ensure, for instance:

- Increased equity of access to higher education.
- An answer to increasing demographic pressures resulting from enlarging the duration of compulsory education (at the time from 6 to 9 years).
- A stronger recruitment among vocational secondary education students.
- Regional preference mechanisms by establishing regional quotas in favour of students resident in the area of the institution.

By the end of the 1980s the supply of courses exhibited diversified designations, offering a well-defined professional profile corresponding to a narrow spectrum of specialised training. In many cases, these different designations covered an array of disciplinary and technological areas of knowledge that coincided with the initial training programmes of the new universities or of the schools of engineering and management/economics of the more traditional universities. In general, polytechnic institutes have followed, at least partially, the philosophy of the new universities' curricular organisation, particularly in relation to curricular flexibility and a discourse addressed at closer connections with local communities.

Fifteen years later, Decree-Law 304/94 of 19 December created the Polytechnic of Cávado and Ave. The integration of the former schools of the Polytechnic of Santarém located in Tomar resulted in the creation of the Polytechnic of Tomar. In Aveiro the former School of Management and Accountancy was integrated into the University of Aveiro, that also created other polytechnic schools: the Aveiro Health School, the Águeda School of Management and Technology, as well as an initiative at the post-upper secondary level (the school Aveiro-Norte).

The Comprehensive Law of the Educational System (Law 48/86) has helped consolidate the polytechnic network. Besides the declaration of intentions on the technical and cultural educational tasks allocated to this sub-system and the new mission of developing capacities of innovation and criticism, the

law reasserted the polytechnics' vocation to train human resources for professional activities through theoretical and applied teaching based on the transmission of scientific knowledge.

The implementation of "Specialised Higher Education Courses" (i.e., CESES¹² in polytechnics by the end of the 1980s was aimed to foster short vocational education, although they were never used to define a continuing education strategy promoting the distinctive profile of polytechnic education. In 1997 the CESES were eliminated and polytechnic degrees became two tier degrees" (3 years + 1 or 2 years), the first cycle conferring the traditional degree of "bacharel" and the second being the degree of 'licenciatura', similar to that at universities.

The statutes of each of each polytechnic institute define its organisational structure, but the law defines the governing bodies. These are the President (uninominal executive body), the General Council (a policy making body) and the Administrative Council (for the current financial administration).

The participation of external representatives is compulsory for the election of the President and in the body of the General Council; it is not required in the preparation and approval of the statutes. The General Council should include external members, but their number may not exceed the number of Schools in the Polytechnic. The external representation is therefore low, averaging 13.2% for the 15 polytechnics.

The legal framework regulating the autonomy of public polytechnics is the Polytechnic Autonomy Act (Law 54/90). It establishes that the polytechnic institutes are public collective entities with statutory, administrative, financial and patrimonial autonomy. However, the Schools integrated in the Polytechnics are juridical entities with scientific, pedagogic, administrative and financial autonomy. This is likely to generate conflicts and makes the coordination of the schools a more complex matter.

Polytechnics do not own their buildings, they cannot change the relative composition of the scales of their staffs and they do not have full pedagogic autonomy. Public polytechnics are not allowed to create, suspend and cancel study programmes, and they must submit these proposals to the approval of Government, through DGES. In addition, updating staff numbers is a lengthy and painful process, which explains that, contrary to public universities, the personnel hired under special contracts plays a quite significant role, representing over 50% of the total staff.

An electoral assembly with 20% of its members being representatives from local authorities and different economic activities elects the President. However, some polytechnics do not comply with this rule and on average the percentage of external members in the electoral assemblies was 15.5% in 2002 (Simão et al. 2002: 424-436). The President may be elected from among the qualified academic staff in the Polytechnic or in any other higher education institution, or from highly recognised personalities with relevant professional experience, although this last possibility has never occurred.

Community participation tends to be higher in the Schools of the Polytechnics, although mostly at an advisory level. The Schools' governing bodies are the Director or the Directive Council, the Scientific Council and the Pedagogic Council (or the Pedagogical-Scientific Council), the Advisory Council and the Administrative Council. The external participation is very high in the Advisory Council (70,9% on average) and is also present, at a much lower level, in about half of the Scientific Councils (7,6% on average) (Simão et al. 2002: 119).

¹²

Entry to the CESES (18 months to 2 years) was open to holders of the 'bacharel' or 'licenciatura' degree. This leads to a diploma, DESE equivalent to a 'licenciatura' for all academic and professional purposes, entitling its holders to attend masters and to be admitted to a doctorate. After obtaining a 'bacharel' degree, students should gain work experience before returning to complete their studies. In practice, most students will chose to complete their programmes without any intermediate work experience.

The private sector

Since 1979, with the publication of Law 9/79 of March 19 (the Basic Legal Framework for the Private and Cooperative Education), the possibility of creating private higher education institutions was wide open, which allowed the official recognition of several institutions even before specific regulation was passed. This only took place later in 1985, giving place to the creation and accreditation of several other institutions. One can accept though that the reasons behind the excessively fast development of the private sector in higher education were both pragmatic and ideological. On the one hand, private higher education could be seen as the possible solution to the increasing demand in higher education that could not be met by the public sector, especially in the years of severe economic stringency following the 1974 Revolution. On the other hand, there were agents that, since the approval of the new Constitution and particularly since the above mentioned Legal Framework for the Private and Cooperative Education, clearly argued in favour of the development of a private higher education sector.

The institutional development of the private sector has always been ambiguous. With the publication of the first statute for the private and cooperative higher education, in 1979, a legal framework was defined for the creation of private higher education institutions. However, at the same time, a close bureaucratic control has been kept over private institutions that were conferred less pedagogical autonomy than public universities. This has been continuously raised by the association of private institutions, APESP, which complains against scientific and pedagogic autonomy. These aspects were recognised by the World Bank that considered in its 1989 Report on the Portuguese higher education system that Portugal still lacked a policy on private HEI's. This situation led the private sector to flourish mainly in areas of greater demand on the short term and low instruction costs.

The development of private institutions was initially rather slow, probably due to the lack of legislation and/or tradition. It should be noted that the Statute for the private and cooperative higher education was published only in 1989, ten years after the setting of an institutional framework. Nevertheless, in January 1979, the Government authorised the first private university by granting the Universidade Livre a temporary permit to initiate operations. It was, in fact, learning from this establishment that, later on, new private universities were created. In 1984 the Universidade Internacional and in 1985, the Universidade Autónoma Luís de Camões, in Lisbon were allowed to start operations. After cancelling the licence to Universidade Livre, the Minister of Education authorised its replacement by recognising, Universidade Lusíada, in Lisbon and Universidade Portucalense in Porto. These were the first private universities, even considering that a number of smaller private institutions were already accredited in the end of 1984, namely Instituto Superior de Psicologia Aplicada, Instituto Superior de Gestão and Instituto Superior de Matemática Aplicada, all located in Lisbon.

Enrolments in private institutions in 1982-83 (including the Catholic University, which was established in 1971) were only about 11% of total enrolments. The pace of implementation accelerated after the mid-1980s. In 1986, the Government recognised new private universities and polytechnic-type institutions, some resulting from upgrading already existing medium level institutions, which until then were not allowed to confer higher education degrees. The new institutions concentrated most of their supply in areas of low investment/low running costs, such as languages and administration, management, journalism, training of secretaries and interpreters, and informatics.

Much of the initial development of the private sector, particularly from 1986-87 on, was due to the strong increase in demand, which could not be satisfied by the public sector and also to the 1989 decision of the Ministry of Education to lower the requirements for entering higher education. The private share of student enrolments jumped from 11% in 1982-83 to 21.6% in 1989-90, and then to 34.7% in 1996-97. From that year total enrolments started to consistently decrease.

The conditions for the creation and operation of private higher education are established in the Private and Cooperative Higher Education Act (Decree-Law 16/94). The founders may be collective private bodies set up specifically for this objective or foundations whose scope includes such a possibility. The founder must adopt the statutes of the higher education institution and present them for Governmental approval.

The founder has the responsibility for the administrative, economic and financial organisation and management, but the institutions must have pedagogic, scientific and cultural autonomy, dully specified in their statutes. Consequently, the law establishes that each private higher education institution must have at least the following governing bodies: a Rector (for university institutions) or a President (for polytechnic institutions); a Director or a Directive Council; a Scientific Council; a Pedagogic Council.

The key issue in the governance of private higher education institutions is the interface between the founder and the institution itself. The relationship between the founders and their higher education institutions is very heterogeneous, ranging from cases of ample scientific and pedagogic autonomy that fosters the independence of thought and of teaching, to examples of strong decisive intervention from the founder in the academic bodies of the institution.

There is no reference in the Private Higher Education Act to external participation in the academic governing bodies. The existence or presence of external personalities or entities, other than the ones associated in the founder entity, is left to the discretion of the institution.

Emerging aspects for concern: the institutional viewpoint

Institutions have raised several other concerns about lacking autonomy and below is a list of some additional restrictions to the full exercise of the autonomy within the limits prescribed by the Autonomy Acts, namely:

- Although the autonomy prerogatives of public higher education institutions are defined in Autonomy Acts passed by the Parliament, it is rather frequent that other laws passed by the government may restrict or change that level of institutional autonomy. For instance, successive Government have decided to freeze or to reduce the number of civil servants, thus preventing institutions from hiring new staff.
- Also, successive Governments have decided to freeze the earned income of institutions, especially in what concerns the accumulated net balances, as a measure to contain the public deficit.
- As the members of the academic staff of both public universities and polytechnics are civil servants, their salaries are fixed at national level, not allowing for the establishment of pecuniary incentives.
- The difficulty in updating the staffs of public polytechnics, which until recently has been through a process of very fast enrolment increase, created increasingly difficulties to the development of academic careers in polytechnics.
- The Autonomy Acts are too prescriptive about the governance structure of public higher education institutions. The Acts define too strictly not only the governance structure of the universities and polytechnics, but also of their schools, without taking into consideration the institutional diversity of the system.

- The autonomy of the university regarding physical assets is complex and can prevent institutions from a rational management of their assets.

Human resource management

The academic and non-teaching staffs of public higher education institutions are public servants. Each higher education institution hires their own staff and each institution makes the decisions about new contracts and promotions. But, in general, academic staff careers are strongly regulated by law and salaries are national, with related values being ruled by law.

Current public university academic staff career has five steps: assistant in training, assistant, assistant professor, associate professor and full professor.

- Assistants in training are hired for a period of one year following a public tender. The contract can be renewed twice for the same period and they need to complete a master degree to be promoted to assistants. Assistants are hired for a period of six years that can be extended for an additional two-years period and they need to complete a PhD until the end of their contract. They have the right to a three-year period without teaching duties to work for their PhD. Once they have completed a PhD and if they have been teaching for at least five years, they have a right to be immediately hired as assistant professors. If they do not complete a PhD their contract will not be renewed.
- After five years following their appointment as Assistant Professors, academics need to present to the Scientific Council of their school a detailed report on their activity over that period. The Scientific Council appoints a board of experts (jury) to decide if their activity is worthy of awarding them tenure or if they will be hired for a new experimental period of five years, after which they are either tenured or fired.
- Promotion to Associate professor and to Full professor depends on public tenders in competition with candidates from the same or different institutions or from abroad. Decisions are made by a board of experts (jury) proposed by the school and appointed by the rector and needs to include a number of members from outside the institution.
- It needs to be recognised that the mobility of university professors is rather low and that in a high percentage of cases those promoted belong to the institution itself.

The public polytechnic academic career differs from the university academic career in structure and in the number of teaching hours. The structure differs mainly because the major post-graduate requirement for career progression is the master level (i.e., a PhD is not being required). The career has three steps (assistant, aggregate and coordinator).

- Assistants are hired following a public tender for an initial period of three years than can be renewed once, for an equal period, and they have to complete a masters degree until the end of this period.
- After this initial period, assistants are automatically hired as aggregate-professors if they hold a masters degree. Otherwise, their contract is discontinued.
- After a period of three years as aggregate professors, a tenure track may be followed. Promotion to Coordinator Professor depends on the results of a public tender.

There are no set rules for the academic careers of the private sector.

There is also a research career in the public sector, which is organised in three steps: assistant researcher, principal researcher and coordinator researcher.

- Assistant researchers are hired following a public tender and candidates need to hold a PhD.
- Promotion to the higher ranks depends on competition in a public tender. The number of people hired as researchers in public universities is rather low and the researcher career is not available in polytechnics.

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TERTIARY EDUCATION IN PORTUGAL: BACKGROUND REPORT

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PART III - THE NETWORK OF TERTIARY EDUCATION

III.1. THE GEOGRAPHY OF TERTIARY EDUCATION IN PORTUGAL

The Portuguese Higher Education system has considerable degree of institutional diversity. It developed faster than any other European system, creating a diversified and heterogeneous network of institutions and study programmes. This part of the report presents main facts related to institutional, geographical, and functional aspects, and to the installed capacity at the level of its integrating sectors (i.e., universities and polytechnics, public and private).

1. Introduction and regional distribution of institutions

There are in Portugal more than 150 higher education institutions. The public sector includes 14 public universities and a non-integrated university school, 15 polytechnics and a number of polytechnic schools integrated in universities, 9 non-integrated nursing schools¹³, 4 university level military schools and 5 polytechnic military schools. The private sector includes 34 university level institutions and 66 polytechnic schools. The Catholic University has activities in a number of places, such as Lisbon, Sintra, Porto, Braga, Viseu, Figueira da Foz and Caldas da Rainha.

Table 3.1 presents the regional distribution of higher education institutions showing that there is a strong concentration in the most populated regions, namely in Lisbon and in the North region.

¹³ The nursing schools in Lisbon, Porto and Coimbra are in a merger process that will transform the 9 autonomous institutions into only three, one in each town.

Table 3.1 – Regional distribution of higher education institutions

Region	Public		Private		Catholic univ.	Public Others		Total
	University	Polytechnic	University	Polytechnic		University	Polytechnic	
Algarve	1	1	2	1				5
Alentejo	1	3	5					9
Centre	3	8	7	9	3		2 ⁱ	32
Lisbon	5	4	20	23	2	4 ⁱⁱ	9 ⁱⁱⁱ	67
North	3	6	14	25	2		3 ⁱ	53
Azores	1							1
Madeira	1			2				3
Total	15	22	48	60	7	4	14	170

NOTES: i – nursing schools; ii – military institutions; iii – 5 military institutions and 4 nursing schools

Source: OCES, 2006

Figures 3.1 and 3.2 present the location of public universities and polytechnics, respectively and of their *campi* in those cases where they are located in different cities.

The location of private higher education institutions is presented in Figure 3.3 (university education) and in Figure 3.4 (polytechnic education). It comprises more than one hundred institutions, including very small private schools. The average size of the student population is around 1,000 students per institution, but in 2003 there were 29 institutions with less than 200 students and 35 institutions with student enrolment between 200 and 500 students.

Figure 3.1 – Location of public universities

Source: DGES, 2006

Figure 3.2 – Location of public polytechnics

Source: DGES, 2006

Figure 3.3 – Private university higher education

Source: DGES, 2006

Figure 3.4 – Private polytechnic higher education

Source: DGES, 2006

2. Regional distribution of vacancies, enrolments and graduates

Figure 3.5 presents the overall distribution of vacancies as well as the distribution of the public and private sectors for the different regions (NUT II). The country average is 8/1,000 inhabitants, with the Region of Lisbon above the average (12/1,000), while the North and Centre are below average and there are quite smaller values for the islands of Madeira and Azores. When only the public sector is considered, the Centre is the most favoured region (6/1,000), closely followed by Lisbon (5/1,000), both above the national average (4.6/1,000). Alentejo and Algarve are slightly below the national average, while the North is well below the national average.

The private sector has a more unbalanced regional distribution, with Lisbon and North above the national average. The Lisbon indicator is well above the national average, almost doubling the national value, while the North region is only slightly above the national average, and all the other regions are below the national average. Therefore, the more favourable situation of Lisbon is mainly due to the contribution of the private sector that concentrates a large proportion of vacancies there. It is also interesting to notice the almost negligible presence of the private sector in the region of the Alentejo and the island of Madeira, and its absence in the Azores archipelago.

Figure 3.5 – The Regional distribution of total vacancies (2005-06)

Source: OCES, 2005

Figure 3.6 presents the regional distribution of vacancies by sub-sector, differentiating university education from polytechnic institutions. The graphic shows a regional concentration of universities that favours the Lisbon Region, almost double the national average. However, polytechnics are more evenly distributed throughout the mainland than universities, with only the Centre Region slightly above the national average.

Figure 3.6 – The Regional distribution of vacancies – university/polytechnic education (2005-06)

Source: OCES, 2005

Further analysis, at the level of the district (Figure 3.7), shows that most higher education institutions are concentrated around the two main cities of Lisbon (33%) and Porto (20%), the third being Coimbra (8%).

Considering only the public sector, Lisbon corresponds to 25%, Porto to 14% and Coimbra to 11%, meaning that the two districts where the two main towns are located correspond to 40% of the total public vacancies. Considering only the private sector, Lisbon accounts for 42%, Porto for 28% and Coimbra for barely 4%: the two districts where the two main towns are located correspond to 70% of the total private vacancies.

The regional distribution of enrolments (Table 3.2) and of graduations (Table 3.3) on the basis of the scientific areas indicates that some important areas represent a rather small percentage of total enrolments. This is the case of Computer Sciences (below 3.5% in all regions and only 0.2% in Madeira), Physical Sciences (below 2.6% in all the mainland regions and only 0.3% in Azores), Mathematics and Statistics (below 1.5% in all regions except Madeira where it represents 4%) and Life Sciences with a maximum of 7.7% in the Azores followed by Madeira with 5.7%, Alentejo with 4.6%, all the other regions below 3.5%. On the contrary, management is the most popular area representing 15% of all enrolments, followed by Engineering with 13%, Health with 12% and Social Sciences with 10%.

Comparing the different regions (Table 3.2) reveals a heterogeneous landscape. Some areas such as Management or Health present a quite uniform percentage of enrolments across the country; other areas such as Teacher Training (20.0% in Azores and 6.0% in Algarve) or Engineering (16.4% in the Centre and 1.2% in Azores) present a very wide variation. Some data is quite surprising, such as the low value of Social and Behavioural Sciences in the Centre (only 6.1%) while others can be explained by regional characteristics such as the high values for Agriculture in Alentejo (8.6%), for Building Industries in Algarve (10.9%) and for Personal Services in Madeira (9.4%).

The analysis of the number of graduates (Table 3.3) reveals a different picture. Teacher Training with only 7.4% of the total enrolments represents 14.9% of all graduates, and Health with 12.1% of total enrolments represents 14.4% of the graduates. On the other hand, Engineering with 13% of all enrolments, contributes with only 7.5% of all graduates.

Figure 3.7 – The distribution at district level (public, private and total) (2005-06)

Source: OCES, 2005

TERTIARY EDUCATION IN PORTUGAL: BACKGROUND REPORT

Table 3.2 – Total enrolments in higher education per scientific area, 2004/05

Areas	Sub-areas	Algarve		Alentejo		Lisbon		Centre		North		Azores		Madeira	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Education	Teacher training	636	6.0	2 293	11.4	8 927	6.1	5 977	7.3	9 136	7.8	671	20.0	415	13.0
	Education Sciences	193	1.8	181	0.9	1 291	0.9	871	1.1	2 150	1.8	46	1.4	141	4.4
Arts and Humanities	Arts	202	1.9	783	3.9	6 198	4.3	4 306	5.3	4 312	3.7	0	0.0	176	5.5
	Humanities	488	4.6	637	3.2	7 676	5.3	2 831	3.5	4 772	4.1	194	5.8	83	2.6
Social Sciences	Social & Behavioural Sciences	1 037	9.8	1 263	6.3	18 520	12.7	4 964	6.1	10 431	8.9	447	13.3	383	12.0
Commerce	Communication and Journalism	244	2.3	320	1.6	4 036	2.8	2 039	2.5	1 649	1.4	44	1.3	0	0.0
and Law	Management	1 756	16.5	3 284	16.4	21 448	14.8	13 365	16.4	16 592	14.2	535	15.9	484	15.1
	Law	0	0.0	142	0.7	8 093	5.6	3 551	4.4	4 844	4.1	0	0.0	0	0.0
Sciences,	Life Sciences	485	4.6	661	3.3	2 427	1.7	1 762	2.2	2 072	1.8	259	7.7	183	5.7
Mathematics	Physical Sciences	254	2.4	490	2.4	3 163	2.2	2 047	2.5	2 157	1.8	9	0.3	113	3.5
and Informatics	Mathematics and Statistics	122	1.1	60	0.3	1 852	1.3	818	1.0	1 318	1.1	21	0.6	127	4.0
	Informatics	214	2.0	641	3.2	3 680	2.5	891	1.1	3 106	2.7	45	1.3	5	0.2
Engineering,	Engineering	1 055	9.9	1 268	6.3	18 845	13.0	13 342	16.4	14 490	12.4	40	1.2	416	13.0
Manufacturing	Manufacturing Industries	189	1.8	697	3.5	764	0.5	1 335	1.6	1 450	1.2	34	1.0	0	0.0
& Building Ind.	Architecture and Building	1 153	10.9	1 097	5.5	10 873	7.5	6 417	7.9	9 507	8.1	72	2.1	35	1.1
Agriculture	Agriculture, Silviculture & Fisheries	150	1.4	1 716	8.6	899	0.6	1 378	1.7	1 365	1.2	128	3.8	0	0.0
	Veterinary Sciences	0	0.0	335	1.7	766	0.5	304	0.4	714	0.6	21	0.6	0	0.0
Health and	Health	995	9.4	1 523	7.6	14 943	10.3	9 275	11.4	18 580	15.9	526	15.7	379	11.8
Social Protection	Social Services	154	1.5	1 052	5.2	3 141	2.2	1 688	2.1	2 799	2.4	146	4.3	0	0.0
Services	Personal Services	1 041	9.8	1 247	6.2	3 701	2.5	2 566	3.1	4 046	3.5	0	0.0	262	8.2
	Transport Services	0	0.0	0	0.0	306	0.2	0	0.0	18	0.0	0	0.0	0	0.0
	Environment Protection	247	2.3	336	1.7	2 022	1.4	1 676	2.1	1 233	1.1	120	3.6	0	0.0
	Security Services	0	0.0	34	0.2	1 698	1.2	80	0.1	209	0.2	0	0.0	0	0.0
	TOTAL	10 615	100.0	20 060	100.0	145 269	100.0	81 483	100.0	116 950	100.0	3 358	100.0	3 202	100.0

Source: OCES, 2005

TERTIARY EDUCATION IN PORTUGAL: BACKGROUND REPORT

Table 3.3 – Total number of graduates in higher education per scientific area, 2003/04

Areas	Sub-Areas	Algarve		Alentejo		Lisbon		Centre		North		Azores		Madeira	
		n	%	n	%	n	%	n	%	n	%	n	%	n	%
Education	Teacher training	277	13.6	797	21.7	3 051	12.2	2 073	14.5	3 633	16.1	168	27.6	219	34.5
	Education Sciences	18	0.9	82	2.2	485	1.9	287	2.0	1 065	4.7	5	0.8	6	0.9
Arts and Humanities	Arts	54	2.7	124	3.4	1 195	4.8	784	5.5	933	4.1	0	0.0	36	5.7
	Humanities	155	7.6	45	1.2	1 155	4.6	628	4.4	812	3.6	64	10.5	52	8.2
Social Sciences	Social & Behavioural Sciences	119	5.8	146	4.0	2 468	9.9	586	4.1	1 529	6.8	31	5.1	0	0.0
	Communication & Journalism	73	3.6	63	1.7	713	2.9	486	3.4	200	0.9	0	0.0	0	0.0
Commerce and Law	Management	342	16.8	556	15.1	4 389	17.6	2 128	14.9	3 259	14.5	33	5.4	63	9.9
	Law	0	0.0	27	0.7	1 379	5.5	388	2.7	686	3.0	0	0.0	0	0.0
Sciences, Mathematics & Informatics	Life Sciences	82	4.0	73	2.0	272	1.1	284	2.0	321	1.4	44	7.2	24	3.8
	Physical Sciences	58	2.9	45	1.2	409	1.6	348	2.4	401	1.8	3	0.5	29	4.6
	Mathematics & Statistics	37	1.8	21	0.6	305	1.2	191	1.3	267	1.2	9	1.5	28	4.4
	Informatics	29	1.4	45	1.2	553	2.2	128	0.9	436	1.9	0	0.0	0	0.0
Engineering, Manufacturing & Building Industr.	Engineering	131	6.4	88	2.4	1 666	6.7	1 472	10.3	1 783	7.9	0	0.0	8	1.3
	Manufacturing Industries	70	3.4	170	4.6	140	0.6	221	1.6	316	1.4	4	0.7	0	0.0
Agriculture	Architecture and Building	83	4.1	93	2.5	1 437	5.8	771	5.4	1 105	4.9	0	0.0	0	0.0
	Agriculture, Silviculture & Fisheries	32	1.6	298	8.1	179	0.7	240	1.7	325	1.4	26	4.3	0	0.0
Health and Social Services	Veterinary Sciences	0	0.0	21	0.6	92	0.4	0	0.0	118	0.5	0	0.0	0	0.0
	Health	115	5.7	519	14.1	3 149	12.6	2 183	15.3	3 626	16.1	178	29.3	110	17.3
Social Services	Social Services	68	3.3	239	6.5	579	2.3	246	1.7	607	2.7	24	3.9	0	0.0
	Personal Services	231	11.4	157	4.3	712	2.9	507	3.6	788	3.5	0	0.0	60	9.4
	Transport Services	0	0.0	0	0.0	73	0.3	0	0.0	6	0.0	0	0.0	0	0.0
	Environment Protection	61	3.0	67	1.8	290	1.2	265	1.9	236	1.0	19	3.1	0	0.0
	Security Services	0	0.0	0	0.0	260	1.0	39	0.3	56	0.2	0	0.0	0	0.0
TOTAL		2 035	100.0	3 676	100.0	24 951	100.0	14 255	100.0	22 508	100.0	608	100.0	635	100.0

Source: OCES, 2005

3. Regional distribution of the academic staff

Table 3.4 and Figure 3.8 present information on the regional distribution of the academic staff and its qualification.

The academic staff is largely concentrated in the regions of Lisbon, North and Centre, where most of the population lives and where the main public universities are located. Only 31% of the academic staff holds a PhD and only 31% holds masters degree as their maximum academic qualification.

Figure 3.8 – Regional distribution of academic staff by qualification

OCES, 2006

At the system level, the analysis of the distribution of the academic staff indicates that the public universities account for 72% of all the PhD holders and for 32% of those holding at least a masters degree. These percentages are respectively 9% and 36% for public polytechnics, 16% and 21% for private university institutions and only 3% and 11% for private polytechnics.

The analysis of the qualification of the academic staff within each sector indicates the public universities have 55% of their staff with a PhD and 24% with a masters degree. These percentages are respectively 10% and 39% for public polytechnics, 27% and 32% for private university level institutions and only 14% and 31% for private polytechnics.

Table 3.4 – The regional distribution of the academic staff

Region	Type of institution	PhD	Masters	Graduation	Other	Total	
Algarve	Public University		226	87	28	2	343
	Public Polytechnic		42	201	264	21	528
	Private University		46	58	77	1	182
	Private Polytechnic		10	13	44	1	68
	Total		324	359	413	25	1 121
Alentejo	Public University		342	231	95	3	671
	Public Polytechnic		71	407	362	17	857
	Private University		43	69	109	2	223
	Private Polytechnic		0	18	17	0	35
	Total		456	725	583	22	1 786
Centre	Public University		1 583	728	634	55	3 000
	Public Polytechnic		332	1 451	1 518	126	3 427
	Private University		173	250	310	10	743
	Private Polytechnic		31	124	201	9	365
	Total		2 119	2 553	2 663	200	7 535
Lisbon	Public University		3 449	1 313	1 309	102	6 173
	Public Polytechnic		263	872	1 277	227	2 639
	Private University		901	1 183	1 762	80	3 926
	Private Polytechnic		168	476	895	90	1 629
	Total		4 781	3 844	5 243	499	14 367
North	Public University		2 260	1 052	795	71	4 178
	Public Polytechnic		323	1 109	1 239	147	2 818
	Private University		660	825	956	46	2 487
	Private Polytechnic		135	567	944	24	1 670
	Total		3 378	3 553	3 934	288	11 153
Azores	Public University		168	112	54	8	342
	Public Polytechnic		6	21	81	2	110
	Private University		2	0	0	2	4
	Private Polytechnic		0	0	0	0	0
	Total		176	133	135	12	456
Madeira	Public University		76	66	65	7	214
	Public Polytechnic		4	13	45	0	124
	Private University		0	0	0	0	0
	Private Politechnic		2	25	80	1	108
	Total		82	104	190	8	446
TOTAL			11 316	11 271	13 161	1 054	36 802

Source: OCES, 2006

References

Correia, F., Amaral, A. and Magalhães, A. (2002), “Public and private higher education in Portugal: unintended effects of deregulation”, *European Journal of Education*, 37.4, pp. 457-472.

PART III.2 - A FUNCTIONAL ANALYSIS

In order to better understand the Portuguese higher education system and its network of institutions and study programmes, a functional analysis of the system including the contribution of each sector – public and private, universities and polytechnics – is undertaken. The analysis focuses on the adequacy of the educational provision in terms of the needs of the Portuguese society, including strengthening the research capacity and the levels of internationalisation, as well as the access of new publics and the provision of lifelong education and industry-science relationships.

1. Post-secondary education

Post-secondary education has been recently reinforced with a new legal framework expanding "Technological Specialisation Programmes" (i.e., "CETs – Cursos de Especialização Tecnológica"), which aimed at conferring students a diploma of technological specialisation and a level IV professional qualification. These programmes are offered mainly to students that completed upper secondary education or that have qualifications equivalent to a level III professional qualification, and are run under the supervision of one of four ministries beyond Higher Education, namely: Education, Economy, Work and Social Solidarity, and Agriculture.

It should be noted that Portugal remains one of the European countries with the lowest supply of lifelong education and retraining opportunities (Table 3.5). Access routes to higher education are, in general, very traditional and most institutions do not have institutionalised practices for enrolling students from other than traditional access routes. Also, the lack of experience and knowledge in the recognition of informal training activities makes transfer between institutions and credit recognition very uncertain for students.

Table 3.5 – Population aged 25 to 64 participating in education and training (%)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
EU15	-	-	5.7 ^e	5.7 ^e	-	8.2 ^e	8.4 ^e	8.3 ^e	8.5	9.9 ^b	11.1	11.9
Belgium	2.7	2.8	2.9	3.0	4.4	6.9 ^b	6.8	7.3	6.5	8.5	9.5 ^b	10.0
Denmark	15.1	16.8	18.0	18.9	19.8	19.8	20.8	17.8	18.4	25.7 ^b	27.6	27.6
Germany	-	-	5.7	5.4	5.3	5.5	5.2	5.2	5.8	6.0	7.4	-
Greece	1.0	0.9	0.9	0.9	1.0	1.3	1.1	1.4	1.2	2.7 ^b	2.0	1.8
Spain	3.9	4.3	4.4	4.4	4.2	5.0	5.0	4.8	4.9	5.8	5.1	12.1 ^b
France	2.9	2.9	2.7	2.9	2.7	2.6	2.8	2.7	2.7	7.4 ^b	7.8	7.6
Ireland	3.9	4.3	4.8	5.2	-	-	-	-	7.6	9.6 ^b	7.2	8.0
Italy	3.4	3.8	4.1	4.6	4.8	5.5	5.5	5.1	4.6	4.7	6.8 ^b	6.2
Luxemburg	3.3	2.9	2.9	2.8	5.1 ^b	5.3	4.8	5.3	7.7	6.3 ^b	9.4	9.4 ^p
Netherlands	13.6	13.1	12.5	12.6	12.9	13.6	15.6	16.3	16.4	17.4 ^b	17.3	16.9
Austria	-	7.7	7.9	7.8	-	9.1	8.3	8.2	7.5	12.5 ^b	12.0	13.9
Portugal	3.5	3.3	3.4	3.5	3.1 ^b	3.4	3.4	3.4	2.9	3.7	4.8 ^b	4.6
Finland	-	-	16.3	15.8	16.1	17.6	19.6 ^b	19.3	18.9	25.3 ^b	24.6	24.8
Sweden	-	-	26.5	25.0	-	25.8	21.6	17.5 ^b	18.4	34.8 ^b	33.3	34.7
UK	11.5	-	-	-	-	19.2	21.0	21.7	22.3	21.2	29.1	29.1 ^p

NOTES: - not available; e – estimated value; b – break in series; p – provisional value

Source: EUROSTAT, 2005

Forms of post-secondary education and lifelong learning were formally introduced with the 1986 Comprehensive Law of the Education System, which defined professional training as an important objective in the structure of the educational system, and established a framework of training activities designed to promote the participation of working people, for the purposes of both professional enhancement and professional conversion (article 19, § 2). For non-formal educational activities (article 23, § 3), the law emphasised the development of technological aptitudes and technical knowledge, which would foster adult adaptation to contemporary life. The educational system was therefore awarded both responsibilities and competencies for continuing education, and the connection between education and professional activity was explicitly assumed, as was the need to prepare students for transition to the labour market.

So far, continuing education has not been provided on a widespread scale, and little has been developed in the way of structures or mechanisms to fulfil this objective (Table 3.6). In particular, higher education institutions, including public polytechnics and universities, have not yet focused their attention on post-secondary education. It is possible that the difficulties created by the declining number of traditional students will force institutions to assume an increasing role in the ‘less traditional’ educational market, including continuing education.

Table 3.6 – Number of people participating in education and training activities

Year	Number of people			Years of formal schooling					
	Total	Men	Women	<4 years	4 years	6 years	9 years	12 years	>12 years
2000	43	22	20 383						
2001	35	19	16 671						
2002	37	20	17 019						
2003	50	27	22 276						
2004	55	30	25 245	206	4	10	16	12	11
August	34	19	15 514	46	2	6	10	7	6

Source: Ministry of Work and Social Solidarity, 2005

Most activities oriented towards continuing education and lifelong learning were to a large extent the results of expectations or demands from the European Union. In this respect too, Portugal’s entry to the European Community in 1986 can be seen as a turning point in the country’s participation in lifelong learning, mainly as result of activities developed with support from the European Social Fund (ESF). This has become the main source of financing for training systems, and indeed the main inspiration behind the organisation of national training policies. In addition to European resources, national programmes, private companies and the students themselves have also financed continuing education, but up to now, all of these latter resources have played a less visible role.

Table 3.7 shows that “Technological Specialisation Courses”, CETs, offered through higher education institutions have involved only 1 302 students in 2005. These CETs were offered through 13 public institutions and 8 private institutions of higher education and represent only 24% of the total number of programmes. Table 3.8 presents the supply of programmes through the different types of schools existing under different ministries.

Table 3.7 – Number of students enrolled in "Technological Specialisation Programmes", CETs, publicly funded through MCTES in 2005

Type of courses	
Computer Applications to Management	79
Automation, Robotics and Industrial Control	14
Building Work Management	50
Irrigated Cultures	25
Project and Design of Mechanical Constructions/ moulds	59
Development of Multimedia Products	149
Design of footwear and morocco	10
Furniture Design	20
Documentation and Information	15
Electronics and Telecommunications	20
Automatic Manufacture – Design an Manufacture of metal-mechanic products	27
Quality Management	25
Management of Tourist Activity	46
Network Management	36
Installation and Maintenance of Computer Networks and Systems	162
Industrial Maintenance	20
Work Organisation and Planning	59
Mechanic Production	20
Food Quality	63
Environment Quality	55
Industrial Chemistry	14
Social service and Community Development	54
Tourism Management Techniques	20
Hotel Management Techniques	36
Food Technology	23
Mechatronics Technology	36
Information Systems Technologies and Programming	123
Telecommunications and networks	42
Total	1 302

Source: MCTES, 2006

Table 3.8 – Technology specialisation courses, CETs, in 2005/2006

a) Number of available courses per area

Area	Secondary and Technical Schools (Ministry of Education)	Universities and Polytechnics (Ministry of ST and Higher Education)	Technological Schools (Ministry of Economy)	Training Schools (Ministry of Work)	Total
Management	3	2	5	0	10
Informatics	21	16	3	7	47
Electronics and Automation	8	3	9	4	24
Construction	16	2	0	0	18
Accounting	25	2	0	0	27
Design	1	0	0	0	1
Marketing and Publicity	2	1	0	0	3
Tourism	9	3	0	0	12
Textile Industry	1	0	3	0	4
Environment Protection	0	1	0	0	1
Metallurgy and Metal-mechanics	2	5	4	2	13
Transforming Industries	0	0	0	0	0
Food Industries	2	1	0	0	3
Chemical Engineering	0	0	1	0	1
Finance, Banking and Insurance	0	0	0	1	1
Personal Services	0	2	0	0	2
Materials	0	0	0	0	0
Agriculture	0	0	0	0	0
Archive Sciences	1	2	0	0	3
Total	91	40	25	14	170
Percentage	54%	24%	15%	8%	100%

b) Number of available technology specialisation courses per area and region

Area	North Region	Center Region	Lisbon Region	Algarve	Alentejo	Total
Management	4	4	2	0	0	10
Informatics	15	14	17	1	0	47
Electronics and Automation	6	9	8	0	1	24
Construction	7	3	4	2	2	18
Accounting	17	4	1	3	2	27
Design	1	0	0	0	0	1
Marketing and Publicity	3	0	0	0	0	3
Tourism	7	4	0	0	1	12
Textile Industry	3	1	0	0	0	4
Environment Protection	0	1	0	0	0	1
Metallurgy and Metal mechanics	4	6	3	0	0	13
Transforming Industries	0	0	0	0	0	0
Food Industries	0	1	2	0	0	3
Chemical Engineering	0	1	0	0	0	1
Finance, Banking and Insurance	0	0	1	0	0	1
Personal Services	0	2	0	0	0	2
Materials	0	0	0	0	0	0
Agriculture	0	0	0	0	0	0
Archive Sciences	0	2	0	1	0	3
Total	67	52	38	7	6	170
Percentage	39%	31%	22%	4%	4%	100%

3. Graduate studies

Graduate education is the main activity of the Portuguese higher education institutions and Table 3.9 presents the number of enrolled students in each sector. Public universities represent 44% of the total number of students, followed by public polytechnics, with 30%, and the private sector, with 27%.

Table 3.10 presents the number of degrees awarded, with public universities contributing with 31% of the total, public polytechnics with 35% and the private sector with 34%. The results report student survival rates and call attention for the increasing importance of guaranteeing student success. There are numerous social, economic and psychological reasons for not completing higher education. Some reasons point to the influence of rhetorical and passive methods of teaching, others to excessively long study programmes, although the inadequacy of student choices has also been indicated as a possible justification. The challenge posed by unsuccessful completion rates of higher education may be helped with the transition of a system based on the transmission of knowledge to a system based on the development of competencies, as discussed within the Bologna process.

Table 3.9 – Number of students enrolled in graduate programmes

Type of institution	Enrolments in 31st December													
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Public														
University	107 644	114 807	121 459	126 221	133 055	140 892	144 220	148 973	153 522	160 120	163 634	162 441	160 093	156 114
Armed forces	1 042	1 015	994	890	835	850	907	917	996	1 082	1 138	1 163	1 252	1 352
Total	108	115	122	127	133	141	145	149	154	161	164	163	161	157
P.Univ.	686	822	453	111	890	742	127	890	518	202	772	604	345	466
Polytechnic	33	40	45	49	54 091	60 026	67 349	74	83	92	98	101	100	97
General	822	431	479	877				740	815	998	461	779	289	018
Polyt-Health	2398	2 894	3 043	3 450	4 664	4 574	4 582	4	5	8	9	9	10	10
Armed forces	323	339	222	300	294	305	305	279	256	198	318	341	368	356
Total Public	36	43	48	53	59 049	64 905	72 236	79	89	101	107	112	111	107
Polytechnic	543	664	744	627				631	862	277	969	012	010	874
Total Public	145 229	159 486	171 197	180 738	192 939	206 647	217 363	229 521	244 380	262 479	272 741	275 616	272 355	265 340
Private														
University	29 540	33 684	36 473	41 191	43 304	48 123	45 680	49 512	47 982	43 429	40 891	38 299	35 456	31 337
Polytechnics	31 285	39 228	48 426	53 220	61 444	62 380	64 243	57 313	59 711	59 501	60 186	60 915	59 797	56 161
Catholic univ.	7 461	8 138	8 294	9 050	9 190	10 021	9 839	10 055	9 833	9 964	9 536	9 762	9 741	9 370
Total Private	68 286	81 050	93 193	103 461	113 938	120 524	119 762	116 880	117 526	112 894	110 613	108 976	104 994	96 868
TOTAL	213 515	240 536	264 390	284 199	306 877	327 171	337 125	346 401	361 906	375 373	383 354	384 592	377 349	362 208

Source: OCES, 2006

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Table 3.10 – Number of students concluding graduate courses

Type of institution	Number of graduates										
	1993/4	1994/5	1995/6	1996/7	1997/8	1998/9	1999/0	2000/01	2001/02	2002/03	2003/04
Public											
University	12 318	12 715	13 680	14 478	14 913	15 161	15 401	15 599	17 223	18 606	18 953
Armed forces ^a	177	143	130	126	147	102	149	162	140	181	178
Total Public Univ.	12 495	12 858	13 810	14 604	15 060	15 263	15 550	15 761	17 363	18 787	19 131
Polyt-General	5 933	6 226	7 323	7 593	8 647	10 512	11 567	14 771	16 364	17 879	18 156
Polyt-Health	868	1 370	1 303	1 848	1 298	1 659	2 518	4 248	3 753	3 951	3 906
Armed forces ^a	138	93	90	68	92	83	103	66	130	106	81
Total P. Polyt.	6 939	7 689	8 716	9 509	10 037	12 254	14 188	19 085	20 247	21 936	22 143
Total Public	19 434	20 547	22 526	24 113	25 097	27 517	29 738	34 846	37 610	40 723	41 274
Private institutions	10 676	12 339	13 117	14 537	16 648	19 332	20 028	20 613	20 052	20 067	19 622
Catholic	1 074	1 004	1 267	1 453	1 644	1 580	1 512	1 570	1 496	1 587	1 770
Total Private	11 750	13 343	14 384	15 990	18 292	20 912	21 540	22 183	21 548	21 654	21 392
TOTAL	31 184	33 890	36 910	40 103	43 389	48 429	51 278	57 029	59 158	62 377	62 666

Source: OCES, 2006.

The funding formula adopted in 2006 introduced a performance indicator aimed to foster the implementation of measures to promote success in higher education. It uses a graduation index (i.e., TEP_j , Graduation index for each graduate programme, j ; Tables 3.11 and 3.12), defined as follows:

$$TEP_j = \frac{3 * D_{t-2} + IPV_{t-1} - A_{t-2}}{4 * \frac{I_{t-1}}{n}}$$

where: D_{t-2} = Number of graduates, year t-2
 I_{t-1} = Total enrolment, year t-1
 IPV_{t-1} = Number of new students in the first year, year t-1
 A_{t-2} = Number of drop-outs, year t-2
 n = Nominal duration of the programme (years)

The graduation index of each institution is obtained as an average of the graduation index of each programme weighted by the number of students enrolled in the programme.

The funding formula adopted in 2006 also introduced a post-graduation index for post-graduate programmes (Table 3.11), which aims at measuring the relation between the number of awarded degrees (masters and PhDs) and the number of teachers with a PhD degree, as follows:

$$TEC_j = \frac{\text{Number of awarded Masters}_{t-2} + 3 \times \text{PhDs awarded}_{t-2}}{\text{Number of PhD holding academic staff, FTE}_{t-2}}$$

The indicator's initial value for university j is calculated as the ratio between the numbers of post-graduate degrees awarded by the institution in year t-2, the number of PhDs being weighted by 3.

Analysis of Tables 3.11 and 3.12 show comparable graduation indexes in universities and polytechnics, although public polytechnics show drop-out and failure rates higher than those typical of other European contexts (with measured survival rate indexes of 54% in 2003, and 59% in 2004), namely in the area of technologies.

Table 3.11 – Graduation index and Post-Graduation index for Public Universities, 2004

Institution	Initial training ("licenciatura")	Advanced training (masters and PhD)	Overall
UTAD	0.66	0.62	0.66
University of Minho	0.64	0.86	0.66
University of Porto	0.62	0.81	0.64
ISCTE	0.55	1.33	0.61
UBI	0.58	0.53	0.58
Technical University Lisbon	0.58	0.63	0.58
University of Lisbon	0.56	0.78	0.58
University of Azores	0.59	0.30	0.57
University of Madeira	0.55	0.61	0.56
University of Coimbra	0.53	0.61	0.53
University of Aveiro	0.52	0.67	0.53
New University of Lisbon	0.50	0.77	0.52
University of Algarve	0.51	0.57	0.51
University of Évora	0.42	0.49	0.42

Source: OCES, 2005

Table 3.12 – Graduation index of Public Polytechnics, 2005

Institution	(only initial training: "bacharelato" & "licenciatura")
IP Viana do Castelo	0.65
IP Portalegre	0.59
IP Castelo Branco	0.58
IP Santarém	0.57
IP Guarda	0.53
IP Cávado e Ave	0.51
IP Viseu	0.51
IP Tomar	0.47
IP Porto	0.46
IP Beja	0.46
IP Bragança	0.45
IP Coimbra	0.43
IP Lisboa	0.41
IP Setúbal	0.40
IP Leiria	0.37

Source: OCES, 2005

Examining enrolments by disciplinary area, Table 3.13 shows that in 1997/98, the year when enrolments started to decline, public universities offered a diversified range of study programmes and courses without any specific concentration of student enrolments. The area with more students, Social Sciences, Commerce and Law, represented less than 25% of the total number of students and there were other four areas with enrolments above 10% of the total, namely: Engineering and Technologies, with

23%, Sciences, Mathematics and Computer Sciences with 15%, Arts and Humanities with 12% and Education with 11%.

Public Polytechnics concentrated their enrolments in Engineering (32%), Management and Business Administration (31%), Education/Teacher training (14%), Health and Social Protection (9%) and Agriculture (5%), which corresponded to the initial recommendations made by the World Bank (Teixeira, Amaral and Rosa, 2003). Private universities concentrated their study programmes in the area of Social Sciences, Commerce and Law, which represented 66% of the total number of students, while each of all other areas represented less than 10% of total enrolment. Private polytechnics concentrated their programmes in the areas of Education/Teacher training (36%) and Management and Business Administration (36%). Education in Health and Social Protection was delivered essentially at nursing schools, representing 9.8% of the total number of students.

Table 3.13 – Enrolments in Public and Private Institutions by disciplinary area, 1997/98

Scientific area	Private sector				Public sector			
	Polytechnic		University		Polytechnic		University	
	Number	%	Number	%	Number	%	Number	%
Education	9 614	35.7	280	0.3	10 276	14.1	16 615	10.8
Arts and Humanities	1 766	6.6	7 599	8.1	2 868	3.9	19 006	12.3
Social Sc., Commerce, Law	9 570	35.6	61 523	65.5	22 321	30.7	38 031	24.7
Sciences, Maths, Informatics	1 089	4.0	5 925	6.3	1 349	1.9	23 188	15.1
Engineering, Manufacturing and Building Industries	1 162	4.3	9 324	9.9	23 518	32.4	35 166	22.8
Agriculture	0	0.0	59	0.1	3 379	4.6	6 441	4.2
Health and Social Protection	2 651	9.8	5 864	6.2	6 560	9.0	8 925	5.8
Services	1 065	4.0	3 340	3.6	2 420	3.3	6 579	4.3
Total	26 917	100.0	93 914	100.0	72 691	100.0	153 951	100.0

Source: OCES, 2005

The effects of declining enrolments

From the mid 1990s the context of Portuguese higher education has shifted as a result of declining birth rates and increasing policy concerns with quality. For example, Table 3.14 presents the evolution of enrolments since 1997/98, showing that the enrolments of private universities decreased 29% since 1997/98. The private polytechnics have been more stable, showing declining enrolments only after 2002/03. The declining trend in the public sector began only in 2003/04.

Table 3.14 – Enrolments in higher education

	97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05
Public	Universities	153 951	158 850	164 722	171 735	176 303	178 000	173 897
	Polytechnics	72 691	80 007	90 286	101 795	108 486	112 532	108 376
	Total Public	226 642	238 857	255 008	273 530	284 789	290 532	282 273
Private	Universities	93 914	89 361	88 190	82 979	79 908	73 708	67 157
	Polytechnics	26 917	28 572	30 547	31 194	31 904	33 046	31 507
	Total Private	120 831	117 933	118 737	114 173	111 812	110 299	106 754
	Total	347 473	356 790	373 745	387 703	396 601	400 831	389 027

Source: OCES, 2005

Table 3.15 lists those private institutions that have closed down in recent years. The low levels of enrolments question the survival of institutions and/or their capacity to meet accreditation standards. Indeed, it will be difficult for some institutions to guarantee the availability of resources to hire good quality academic staff, maintain a good library and provide the appropriate institutional environment in the context of continuing student enrolment decline. In particular, institutions have shown strong “isomorphic” behaviour, in that new programmes attracting students are followed by a duplicating phenomenon giving rise to similar programmes created elsewhere without adequate attention to the necessary conditions for providing good quality education. This has happened in certain degree programmes such as “management”, “environment”, and more recently “health”.

Table 3.15 – Private institutions that have ceased activity in 2005

Institution	Enrolments in 31 st December														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Autónoma ^k	234	423	543	717	796	826	812	672	538	371	232	104	60	24	
Internacional ^g	181	191	233	199	152	93	62	30							
COCITE ^a		41	63	15											
COCITE ^b		62	114	117	78	65	52	36							
I.Erasmus ^c	361	703	1055	1276	1747	2186									
I.Erasmus ^d				163	343	375	366	257							
IESF ^e	70	117	238	285	266	201	127	73	87	83					
ISCIE ^e	630	997	1280	1669	1812	2066									
ISG ^a				177	133	99	79	58							
ISHT ^f	54	99	147	142	119	162	151	137	62	51	18				
ISHT ^a				11	11	11	19	34	30	16					
ISTH ^l				33	41	59	110	108	105	78	68	61	50	42	
ISMG ^e	344	730	1213	3001	4415	5723	7394	7588							
ISMG ^f				145	169	178	184	148	106	88	38	16	10		
ISMG ^l				109	180	211	246	413	379	397	335	284	258	247	
ISPI ^g	58	53	33												
ISPP ^h	88	138	209	120	106	42									
ISPP ⁱ	172	304	462	529	608	619	523	393	248	115	70	29	20		
ISPP ^j	52	102	131	123											
ISTE ^e															22
ISTr ^e				24	46	62	56	58	54	42	42	16	11		
ISTrCom ^e			40	73	104	139	161	165	145	134	127	104	37	22	

a – Torres Vedras; b – Setúbal; c – Porto; d – Ponte de Lima; e – Lisboa; f – Castelo Branco; g – Chaves;

h – Lamego; i – Penafiel; j – Santo Tirso; k – Caldas da Rainha; l – Portimão

Source: OCES, 2005.

Decreasing enrolments are not confined to the private sector and Figure 3.9 presents the number of institutions with less than 100 first year students.

Figure 3.9 – Number of institutions enrolling less than 100 students in the first year

Source: OCES, 2005

Table 3.16 presents the decline in the number of new students entering private universities. The total decrease was about 25% in the first year of enrolment, although this was unevenly distributed: the area of Social Sciences, Commerce and Law presents a 35% decrease, all the other areas show a 11% decrease. First year total enrolments in Law declined from 1,705 in 1997/98 to 674 in 2004/05, which corresponds to a 61% decline.

Table 3.16 – First year enrolments in the private university sector

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Total private university	16 823	17 141	16 575	16 942	16 333	16 137	14 528	12 545
Social sciences, commerce, law	10 107	9 501	8 729	9 099	8 477	8 682	7 721	6 538
Others	6 716	7 640	7 846	7 843	7 856	7 455	6 807	6 007

Source: OCES, 2005

In private polytechnics, the number of first year students has changed from a total of 8,875 in 1997/98 to a maximum of 10,669 in 2001/02, and then decreased to 8,453 in 2004/05. This showed a decline of only 5% relative to 1997/98 (see Table 3.17), although with larger values in two major traditional areas, namely: Education (from 37% to 24%) and in Social Sciences, Commerce and Law (from 32% to 14%), while a large increase from 14% to 52% occurred in the area of Health and Social Protection.

Table 3.17 – Evolution of first year enrolments in the private polytechnic sector (%)

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Education	36.9	38.3	53.3	48.5	44.4	39.3	33.0	24.4
Arts and Humanities	7.7	6.0	4.1	4.7	3.5	3.8	3.5	4.3
Social Sc., Commerce, Law	31.6	27.3	17.7	14.0	13.2	12.5	12.9	14.0
Sciences, Mathematics,	3.8	3.7	2.9	2.9	2.4	2.3	1.9	1.9
Engineering, Manufacturing and								
Building Industries	3.2	4.1	2.2	2.5	2.3	1.7	1.9	1.8
Agriculture	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Health and Social Protection	13.7	17.6	18.0	25.7	32.6	38.1	44.4	52.1
Services	3.2	2.9	1.7	1.7	1.6	2.3	2.4	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: OCES, 2005

The decrease in enrolments in the public sector is more recent. Nevertheless, the health sector in the public polytechnics has increased its first year enrolments from 2,543 in 1997/98 to 5,680 in 2004/05. Similarly, architecture that in 1997/98 had total first year enrolments in universities equal to 1,498, offers a total number of vacancies equal to 2,166 for the next academic year, 2006/07, 546 of them in the public sector and the other 1,620 in private institutions, while the number of study programmes has doubled from 12 to 24.

Following the data presented in Part II of this report, the analysis of enrolments in all programmes across the whole system show programmes with very few students. For example, in 2005 there were 286 programmes in public universities with less than 100 students (and of these 161 had less than 50 students and 70 had less than 25 students), and there were 227 programmes in public polytechnics with less than 100 students (and of these 125 had less than 50 students and 39 had less than 25 students). In addition, some public institutions opened *campi* in several towns around its main campus, as listed in Table 3.18. These initiatives were often taken in answer to the demands of local authorities and in most cases resulted in establishing small schools.

Table 3.18 – Number of students in new campi established by public institutions outside their main centre of activity

Institution	Area and localization of school	1 st year, 1 st year, 1 st year, 1 st year, time 03-04 time 04-05 time 05-06
Universities		
Algarve	Gestão, Hotelaria e Turismo de Faro (Portimão)	129 124 90
Aveiro	Tecnologia e Gestão (Águeda)	217 234 190
Aveiro	Design, Gestão e Tecnologias da Produção Aveiro-Norte	0 0 30
UTAD	UTAD (Miranda do Douro)	87 54 51
UTAD	UTAD (Chaves)	145 113 108
Polytechnics		
Bragança	Tecnologia e Gestão (Mirandela)	183 251 221
Castelo Branco	Gestão (Idanha-a-Nova)	139 193 208
Coimbra	Tecnologia e Gestão (Oliveira do Hospital)	100 123 107
Guarda	Turismo e Telecomunicações (Seia)	94 94 80
Leiria	Artes e Design (Caldas da Rainha)	276 266 311
Leiria	Educação (Caldas da Rainha)	0 0 0
Leiria	Tecnologia (Peniche)	207 169 233
Portalegre	Agrária (Elvas)	63 82 59
Porto	Estudos Industriais e de Gestão (Vila do Conde)	247 249 267
Porto	Tecnologia e Gestão (Felgueiras)	105 158 171
Santarém	Desporto (Rio Maior)	105 147 145
Setúbal	Tecnologia (Barreiro)	84 90 46
Viana do Castelo	Agrária (Ponte de Lima)	82 45 31
Viana do Castelo	Ciências Empresariais (Valença)	26 45 38
Viseu	Educação (Lamego)	127 106 117
Viseu	Tecnologia (Lamego)	106 137 145
Tomar	Tecnologia (Abrantes)	91 80 99
TOTAL		2 613 2 760 2 747

Source: OCES, 2006

3. Post-graduate programmes

Post-graduate programmes are still a minor activity at the university level, representing less than 12,000 students in 2005 (Table 3.19). At present, the traditional Masters offered by university level institutions corresponds to about 8% of total enrolments in public universities (Table 3.20). It should be noted that the new Decree-Law regulating the implementation of the Bologna process gives polytechnics the possibility of offering the new Bologna second cycle of studies.

Students enrolled in masters' programmes in public universities represented in 2004 about 85% of the total number of post-graduation students, with the Catholic University representing 50% of the private sector.

Table 3.19 – Enrolments in public universities (masters degrees, “Mestrado”)

	Enrolments in 31st December														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Public	3 015	3 906	4 485	4 550	5 088	5 231	5 607	6 173	6 590	7 448	7 315	7 380	9 226	9 388	9 752
Private	222	406	612	737	837	908	1059	1275	1251	1277	1377	1165	1298	1718	1670
Total	3 237	4 312	5 097	5 287	5 925	6 139	6 666	7 448	7 841	8 725	8 692	8 545	10 524	11 106	11 422

Source: OCES, 2006

Table 3.20 – Percentage of advanced training students enrolled in Portuguese public higher education institutions in 2005-2006

	Initial training students ('Licenciatura' and 'Bacharelato')	Advanced training students ('Mestrado' and specialisation programmes)	(%) Percentage of advanced training students in total students
U. ALGARVE	8 380	338	4
U. AVEIRO	10 288	731	7
U.B.I.	5 096	140	3
U.COIMBRA	17 389	1 484	8
U. ÉVORA	7 033	533	7
U.LISBOA	16 791	1 587	9
U.MINHO	13 796	921	6
U.N.L.	12 338	1 252	9
U.T.L.	18 493	2 202	11
U.PORTO	21 839	2 607	11
UTAD	6 322	283	4
ISCTE	5 109	750	13
U.AÇORES	2 731	90	3
U.MADEIRA	2 484	48	2
SUB-TOTAL Universities	148 089	12 966	8
Other: Polytechnics	91 496	486	1
TOTAL	239 585	13 452	5

Table 3.21 presents the number of Masters awarded by Portuguese institutions, confirming the concentration of degrees in public universities in the same proportion as that for total enrolments.

Table 3.21 – Students completing Masters

	2001/02	2002/03	2003/04
Public	1 987	2 543	2 673
Private	435	461	489
Total	2 422	3 004	3 162

Source: OCES, 2006

Table 3.22 lists the number of doctoral degrees awarded during the last three decades. Their relative increase over recent years is a measure of the level of resources being dedicated to research and post-

graduate training. Public universities awarded 71% of all degrees, 28% being awarded by foreign universities and the remaining 2% by Portuguese private institutions. From the total number of 12,849 PhD degrees awarded since 1970, there are 11,316 PhD holders in the academic staff of higher education institutions.

Table 3.22 – Number of PhDs awarded by Portuguese and foreign universities

	1970-9	1980-9	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	Total
Portugal	293	1 247	250	223	245	378	319	432	459	467	480	575	693	699	799	836	926	9 321
Abroad	477	818	87	96	106	115	133	137	149	120	236	196	161	206	175	174	142	3 528
Total	770	2 065	337	319	351	493	452	569	608	587	716	771	854	905	974	1 010	1 068	12 849

Source: OCES, 2005.

A recent study conducted on the student composition (Figure 3.10) of one of the Portuguese schools with the largest number of post graduate students (i.e., IST of UTL, as in Table 3.20) compares its student structure with those of some master universities and some research universities, as classified by the Carnegie Foundation. Analysis must be done with caution due to the relative duration of the various programmes. Indeed, hosting foreign professors and students at the post-graduate level is a characteristic of the American research universities, which has become an important condition to guarantee university excellence. Research universities in the USA are responsible for nearly 70% of all foreign students, the great majority being post-graduate students.

Portugal graduates only three fifths of the total number of PhDs of Spain for each 1,000 graduates from higher education. This corresponds to about 1/5 of those PhDs annually graduated in the Netherlands, or 1/7 of those graduated in Germany, for each 1000 graduates from higher education (see Table 1.9 for details).

In terms of the active population, Portugal graduated in 2001 about 3 new PhDs in science and engineering for each 10,000 inhabitants aged 25-34, while this figure for the EU15 was about 5.5.

Figure 3.10 – Comparison between the student structure of IST- UTL and some American masters and research universities

Source:

UTL(2005), "Knowledge production and diffusion at UTL, 1995/95-2002/03", UTL.

Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; **(7) Technical University of Lisbon** (as based on figures only from engineering students at Instituto Superior Técnico); (8) Cumberland University; (9) University of Arizona; (10) Colorado State University; (11) Georgia Institute Technology; (12) University of Maryland Baltimore; (13) Portland State University; (14) Arkansas State University

Note 2: Data for 2003: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; Data for 2002: all other universities; According to Carnegie Classification, this figure show 11 research universities and 3 master universities (American universities)

Sources: Annual reports, requests to universities for information

4. Academic Research

In 2003 academic research represented about 50% of the total expenditure in R&D (including expenditure by higher education and related non-profit institutions), accounting for 510 M€ Total expenditure (public and private) in R&D was 0.78% of the GDP, reaching 0.85% in 2001, when the European average was 1.98% for the EU15 (Figure 3.11). Higher education and related non-profit institutions represented in 2003 about 74% of Portuguese researchers (FTE), with a total value of 24,726 researchers (i.e., head counts) or 13,008 FTE researchers. In December 2004, higher education institutions included 11,316 teaching staff members holding a PhD degree.

In the context of this discussion, it is important to note that in 2001 Portugal was, for the first time in history, part of the group of the countries of excellence that contributed to the share of top 1% of the world's highly cited publications (King, 2004). Between 1997 and 2001, Portuguese researchers contributed with 0.25% of the overall figure. Spain was responsible for 2.08%, whereas Ireland and Greece accounted for 0.36% and 0.3%, respectively.

Figure 3.11 – Portuguese gross expenditure in R&D (GERD, %) as a fraction of GDP, with identification of the various Governments

Source: EUROSTAT

Figure 3.12 – Number of scientific publications in ISI Journals over time for a sample of small nations

The development of Portuguese science and, in particular, academic research has been achieved in a comparatively high international context and Figure 3.13 shows that 53% of the scientific publications registered at ISI in 2003 were made in international co-authorship.

Figure 3.13 – Fraction of scientific publications in ISI Journals made in international authorship **Figure 3.14 – Expenditure in R&D per researcher (1000 €/ FTE), 2001**

Notes: data for 2001 or last year available (Austria, United Kingdom: 1998; Belgium, Denmark, Greece, US: 1999; France, Ireland, Italy, Netherlands, UE-15, UE-25, Turkey, Switzerland: 2000); "FTE" refers to "full time equivalent".

The rapid increase in the number of researchers in Portugal was recent. It is linked to the implementation of the CIÊNCIA programme in the beginning of the nineties and later to the programme of advanced training scholarships sponsored by the Science and Technology Foundation that allowed the number of PhD holders and researchers to increase sharply in all scientific domains (FCT, 2002). It is worth mentioning that the average funding per researcher in Portugal is still one third of the European average in the beginning of the twenty first century, even considering EU25. However, researchers in higher education in a Europe of 25 have practically half of the funding of their colleagues in the United States, as Figure 3.14 shows. Additionally, in 2002 the Portuguese overall R&D funding per inhabitant was barely 39% of the respective EU-25 average (and only around 74% in comparison with Spain).

Furthermore, Portugal's GDP per capita was at that time just about 75% of the EU-15 average, which demonstrates the real deficit in R&D funding in Portugal.

The funding structure of R&D activities is characterised by a strong State participation. In 2001 the State sector funded around 56% of total R&D activities in the EU, while it represented 61% in Portugal. It is also known that these figures differ from the R&D funding structure in more economically and technologically developed countries (i.e., countries where private R&D funding is larger, as is the case of the United States of America: 66%, Sweden: 72%, Finland: 71%).

The funding structure is consistent with the low employment percentage in knowledge-intensive sectors (Table 3.23). Also, the number of PhDs working in industry is very low (Table 3.24). Nevertheless, in the second half of the 1990's, the number of companies active in R&D doubled in Portugal. These companies compete internationally with qualified human resources, R&D and innovation, marketing, design, training and quality, co-operating with S&T institutions.

Table 3.23 – Employment in knowledge-intensive service sectors (share of total employment, %) for EU15, Portugal and some selected countries

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
EU ₁₅		6.33 ^s	6.29 ^s	6.24 ^s	6.32	6.29	6.28	6.17	6.07	5.89 ^s	5.7 ^s
Greece	2.13	2.12	2.08	2.01	2.21 ^b	2.000	1.97	1.99	1.91	1.75	2.05
Spain	4.79	4.67	4.61	4.84	4.92	4.85	4.78	4.92	4.87	4.55	4.34
Ireland	4.45	4.30	4.35	4.40	3.94 ^b	4.05	3.53	3.71	3.69	3.38	3.77
Finland		5.17	5.28	5.11	5.27	5.18	5.25	5.25	5.38	5.09	4.85
Portugal					3.14	3.17	3.14	3.05	2.91	2.87	3.08

Notes: s – EUROSTAT estimate; f – Break in series Source: EUROSTAT (2005)

The deficit of Portuguese private R&D can be better understood through recent analysis of private R&D in Europe (e.g., DTI, 2004). This study identified the critical role of multinational corporations in Europe, as well as the importance of research and development activities for their success. Nevertheless, it is worth mentioning that whereas a medium-sized multinational in the north of Europe invests more than 6% of its turnover in R&D, one of the largest Portuguese companies (for instance, in the car component sector), with a turnover 10 times lower, invests around 3%. This results in a ratio of 1 to 20 in terms of resources – but only 1 to 2 in terms of turnover – allocated to research and development activities. As multinationals have not moved to Portugal¹⁴, at least in a way that might increase the private sector R&D, and within the current context of foreign direct investment in southern Europe and particularly in Portugal, it is urgent to rethink the relationship of the university with the private sector to ensure a process of European convergence in terms of the S&T at the national level.

Table 3.24 – Number of researchers with a PhD working in industry*

Year	Number of PhDs
1995	41
1997	94
1999	104
2001	113
2003	189

* includes those with equivalence to a PhD
Source: OCES, 2005

¹⁴ There are exceptions such as the recent development of the Centre for Innovation of Siemens Portugal, in Carnaxide.

Strengthening S&T

Science and technology got a major boost in the mid 1990s with the implementation of specific policies focused on the promotion of human resources and scientific institutions. The Ministry of the Science and Technology was created in 1995, resulting in profound institutional changes. Three new organisations were created: the Foundation for Science and Technology (FCT) with evaluation and financing responsibilities, the Institute for International Cooperation in S&T (ICCTI) for promoting international cooperation in science and technology, and the Observatory of Sciences and Technologies (OCT), with observation, inquiry and data analysis responsibilities. In addition, the development of the Portuguese scientific and technological system was stimulated within the framework of a deep reform in the evaluation of R&D institutions, to guarantee the independence and effectiveness of the evaluations, the publication of the respective methodologies and results, as well as the exercise of the right of appeal. This exercise included all academic research units, and the implementation of new programmes to foster advanced training, namely at the PhD level, and to promote the mobility of human resources.

Major reforms implemented in the second half of the 90's to increase the R&D potential by investing in advanced training of human resources and in competitive funding of R&D activities, as well as in strengthening R&D institutions and their internationalisation, included the following measures (OECD, 2002):

- R&D programmes integrated scholarship grants for initial (graduate) and advanced (PhD and Post-doc) training and the launching of scientific careers. This was based on funding research projects in all scientific domains on a competitive basis by international quality standards. Similar measures were contemplated for advanced human resources training and research targeted to ICT.
- Project funding was dependent on quality assessment by independent evaluation panels that included a majority of international experts. Application for funding was opened yearly by the FCT for all areas of knowledge. Beneficiaries were research teams in public or private institutions with R&D activities, and business enterprises in consortia with R&D institutions or engaging in integrated R&D programmes. Since the aim was to develop the general science base, there was no thematic prioritisation in the general funding programme. Project selection was based on project and team quality assessment.
- Dedicated thematic programmes also addressed public interest issues (e.g. forest fires, marine science, ethnic minorities, protection of natural environments, drug addiction) and participation in international R&D institutions of which Portugal was a member (EMBL, ESO, ESRF, ESA, CERN, ESO). Evaluation parameters and procedures were similar to those of the general programme. In the context of Information Society, new R&D programs were set up, targeted at ICT and their use in social and economic contexts, and computational processing in Portuguese language.

Academic research is organised in “Research Units”, most of them associated to public universities (Table 3.25). To strengthen the institutional development of sample units, “Associated Laboratories” have been created and promoted since 2000 and incentives were provided for the continuous implementation of independent scientific evaluations. This process has involved the reorganisation of part of the R&D system and strengthened the level of responsibility and accountability to society.

Table 3.25 – Research centers accredited by FCT, 2004

Type of institution	Centres
Public universities	384
Public Polytechnics	8
Catholic University	14
Private universities	7
Other private institutions	20
Total	433

Source: FCT

The network of associated laboratories created since 2000 consisted in specific contracts with networks of existing R&D units with strategic orientations and missions considered of public utility. The status of “associated laboratory” was conferred by the Ministry of Science and Technology for a period of up to ten years, through a contract that specified the amount of public funding of the laboratory and their missions. These laboratories had an initial funding for five years, being evaluated after that period and at the end of the contract period, which can be renewed after positive evaluation.

Fifteen associated laboratories were established in 2000 and 2001, integrating 31 R&D institutions. There are today 21 associated laboratories involving 38 R&D institutions in Physics, Chemistry, Earth and Space Sciences, Marine Sciences, Geological Sciences, Health Sciences, Materials Sciences and Engineering, Chemical and Biotechnological Engineering, Electrical and Computational Engineering and Social Sciences. These laboratories include 41 research units, have 2,200 researchers, 1,452 of them holding a PhD, and had funds totalling € 268 Million for the first 10 years (as in <http://www.fct.mct.pt/pt/apoios/laboratoriosassociados/quaiacao/>).

An important infrastructure in the networking of R&D institutions was the creation of an information network (i.e., RCTS), linking universities and research centers, libraries and elementary and secondary schools by broadband. All linked institutions were provided sub-domains, e-mail accounts and space for web pages. One of its developments was the creation of a Network Science and Technology Library connecting all adherent institutions to common library resources online and to international databases. The first step towards the creation of this Science and Technology Library has already been taken through an agreement with the Institute for Scientific Information, making ISI’s databases available online to all Portuguese research institutions.

The *Innovation Agency* (AdI, <http://www.fct.mces.pt/pt/empresas/inovacao/>), was created in 1993, co-coordinated with the S&T policy, implementing support for consortia of business and R&D institutions and promoting the economic use of R&D results.

New policies to foster the public understanding of science and technology were also introduced, particularly during the second half of the 90’s. The “Ciência Viva” has been particularly ambitious in promoting dissemination activities and supporting cooperative networks of basic and secondary schools with research centres. The importance of promoting science education and/or creating science culture has been widely identified and discussed (Gago, 1990). There were two main arguments to consider: first, S&T should be seen as an open system, with different and diversified ways of participation, mainly derived from the fact that scientific activity is increasingly part of people’s life, so that the training of scientists should not be confined to a specific group of people, but rather developed broadly and part of today’s education; and second, the goal of fostering the public understanding of science, where schools and other institutional settings (e.g, science museums) have a determinant role in stimulating curiosity and the interest for scientific knowledge.

Assessing of R&D Institutions

The implementation of a new model for funding and assessment of R&D units was launched in 1996, covering all 270 units existent at the time. International expert panels rated the units in a five degrees scale, ranking from 'poor' to 'excellent', and making recommendations for strategic orientation, future investment and activity plans. Quality assessment took into account research performance by international standards, including publications in international journals and patenting activity, where appropriate. Subsequent evaluations took into account the compliance with the recommendations and the good use of the previous funding, besides R&D performance and publications (OECD, 2002). Following the assessment exercise, funding for units classified as Poor was discontinued. The remaining 257 units were funded under the multi-year funding Programme for R&D Units of FCT, receiving base funding per post-doc, with the level of funding being partially based on the assessment. Following consideration of appeals submitted by certain units, distribution of the classifications Excellent, Very Good, Good and Fair among the units receiving funding was 17%, 31%, 32% and 19% respectively.

The second assessment of 1999/00 included the units assessed in 1996 and funded under the multi-year funding Program of FCT, covering a total of 263 units and 4,068 PhDs, and including new units that had become autonomous or were the result of mergers of units assessed in 1996. Around 160 foreign scientists, organised in 21 separate panels, took part in the 1999 assessment, which included the analysis of reports and activity plans, as well as visits by the assessment panels to the research units.

The third assessment of 2002/04 involved the Units financed through the multi-year funding Program of FCT, including those resulting from the partition or merger of Units evaluated in 1998 or 1999. It focused on the assessment of the activities carried out in the period 1999/01, as well as on the activity plans for 2003/05. It also assessed the applications submitted to the 2001/02 calls for proposals for new Research Units. One hundred and eighty international and Portuguese experts, belonging almost entirely to foreign institutions, made up the panels responsible for the evaluation.

The results of the assessment are given in detail elsewhere (FCT, 2005), but a number of general observations clearly expressed during the evaluations are of particular interest. Table 3.26 presents the main indicators of the Portuguese Research Units in 1996, 1999 and 2003. The steady increase of the number of PhDs and Units from one evaluation cycle to the other is clearly evident, reflecting the impact of a stable financing model on the R&D system that is becoming progressively more mature. The number of PhDs increased at an average rate of 19%/year in the period 1996-2003. The average size of the Units increased too, but the growth seems to be stabilising from 1999 to 2003.

Table 3.26 – Situation of the Portuguese Research Units in 1996, 1999 and 2003

Indicators	1996	1999*	2003
Number of PhDs	3 575	5 823	8 324
Number of units	270	354	473
Average number PhD/unit	13.2	16.4	17.6

*Consolidated in December 2000.

Source: FCT, Evaluation of Research Units 2002-2004, overall report

Research Units have a significantly smaller dimension in the Arts, Social and Human Sciences areas than in the remaining part of the Portuguese R&D system (Figure 3.16). The numbers, however, also show that those areas are growing at a faster rate, increasing their share of the overall system in terms of the

number of Units and PhDs, respectively from 27% to 39% and 21% to 30%, from 1996 to 2003. In spite of these increases, the average dimension is still small, probably below a critical threshold value.

Figure 3.15 shows the evolution of the number of Full Time Equivalent (FTE) PhDs in the Research Units, per scientific area, from 1996 to 2003. Considering the 2003 data inclusive of the Associated Laboratories, it can be observed that the number of PhDs increased steadily, for almost all areas, from one evaluation to the other. Between 1999 and 2003, this general increase was particularly noteworthy for areas such as Philosophy, Art and Architecture, Economics and Management, Health Sciences, History, Sociology, Anthropology, Demography and Geography, Literature and Electrical and Computer Engineering, which grew 88.7%, 88.0%, 79.6%, 62.3%, 61.6%, 57.9%, 54.7% and 54.6%, respectively. Figure 3.15 also reflects the heterogeneous distribution of the number of PhDs integrated in the 15 Associated Laboratories (AL) existing in December 2003 across the different scientific areas.

Figure 3.15 – Evolution of the number of FTE PhDs in research units per scientific area, 1996 to 2003

Source: FCT, Evaluation of Research Units 2002-2004, overall report

The analysis can be taken a step further by considering the data in Figure 3.16, which represents the evolution of the number of Research Units from 1996 to 2003. Again, the growth in the number of Units in the Arts, Social and Human Sciences areas from 1996 to 2003 was evident, being particularly important in Art and Architecture, History and Economy and Management (300%; 200%; 182%). The distribution of the number of Units integrated in Associated Laboratories was also not homogeneous, although the differences were smaller than in that case of the number of PhDs.

Figure 3.16 – Evolution of the number of research units per scientific area, 1996 to 2003

Source: FCT, Evaluation of Research Units 2002-2004, overall report

Figure 3.17 compares data of Figures 3.15 and 3.16 and quantifies the average dimension of the Research Units in the different areas. The results show a steady increase in the PhDs/Research Unit ratio from 1996 to 2003, with higher average ratios in the following areas (by decreasing order): Chemical Engineering and Biotechnology (34), Marine Sciences (29), Chemistry (25) and Materials Science and Engineering (25). Conversely, the areas with lower average ratios are Art and Architecture (8), Law and Political Sciences (8), Philosophy (12) and Communication Sciences (12), all Arts, Social and Human Sciences areas. It should be noted that two of these areas were evaluated and financed for the first time in 2003.

Figure 3.17 – Evolution of the ratio PhD/unit per scientific area, 1996 to 2003

Source: FCT, Evaluation of Research Units 2002-2004, overall report

These policies have resulted in continuous increase in the number of doctorates, especially when considering European and international figures. This fact has been referred by the generality of the evaluation panels as decisive (Heitor, 2000). The number of scholarships for advanced training awarded by the Foundation for Science and Technology (Figure 3.18) gave an important contribution for the progress registered in research activities.

Figure 3.18 – Scholarships for advanced training (Masters, PhD and post-doctoral)

The growth of academic research during the last decade can also be assessed in terms of the number of research collaborations at European level and Figure 3.19 quantifies the relative strength of the Portuguese participation in the 6th Framework Programme by scientific field.

Figure 3.19 – Number of projects for the Portuguese participation in the 6th Framework Programme, by scientific area

Fostering industry-science relationships

Existing programmes seeking to develop university-industry links include:

- Doctors and Masters in Companies and Technology Centres, aiming at encouraging firms to recruit human resources holding a doctoral or a master degree, in order to strengthen the companies' R&D, technological innovation and competitiveness.
- IDEIA – Applied R&D in Companies, aiming at supporting cooperative R&D projects involving companies and S&T organisations, in order to develop new products, process or services. The programme gives special emphasis on product innovation.
- Centres of Excellence – Competence building making use of ICT – is a programme aimed at supporting networking of companies, research centres, Universities, Polytechnic Institutes, Public bodies and business associations. The main goals are the following:
 - encouraging linkages between companies, research centres, high education and universities to develop networks;
 - promoting the development of new and better services and new technologies;
 - orienting sector and regional S&T development toward key areas;

- contributing to improve education curricula.
- NEST – New Technology Based Companies, to provide financial support to the creation, launching and development of technology-based firms that have a close relationship with domestic S&T organisations and/or are expected to reach a high level of technological capacity.
- The NEOTEC Initiative is concerned with the provision of seed capital for the creation of new technology-based firms, by supporting them in the different stages, from the identification of market potential to the commercialisation. Its aims include encouraging the carrying out of research activities and the exploitation of its results and stimulating entrepreneurship and an innovation culture.

Figure 3.20 presents the results (accumulated values) of the programme “Doctors and Masters in Companies and Technology Centres” which is contributing to increase the number of industry-employed people holding a postgraduate degree.

Figure 3.20 – Number of successful applications and of new companies in the programme “Doctors and masters in Companies and Technological Centres”.

Source: Adi, 2006

The diffusion character of R&D consortia may be analysed basis of the projects approved by the Innovation Agency, AdI, in the period 2001/2002, which involved 119 research projects undertaken by consortia of science and technology (S&T) companies and academic R&D units. Although most of the support was concentrated on projects led by companies from the high and medium-high technological intensity sectors (69%), there was significant participation of projects in sectors with greater weight in the Portuguese economic fabric that are generally classified as being of low technological intensity (44.3% of the number of participations), as shown in Table 3.27. The impact of these projects in the modernisation of the economic fabric is even more important given the high diffusing potential of the consortia. As was the case with the projects supported in 1996-2000, the great majority concern product innovation (77%), in order to facilitate adding value to national production. Furthermore, as most of the product innovation projects are for items of equipment and software, which represent production means for other economic sectors, they will contribute towards technological modernisation of those sectors, spreading the results of innovation. This is readily apparent in the matrix shown in Table 3.28, which juxtaposes the main technological areas of the projects and the main application sectors of the technologies being developed.

Chemical technology is spread through the textile, clothing and footwear sectors, as well as to the wood and cork and environmental sectors. Material technologies are strongly co-related with the construction, mechanical, and plastics sectors, as well as to the electronics sector. Mechanic technologies are playing a spreading role in the transport materials, textile, and electronics sectors. Finally, the information and communication technologies (ICT), with their horizontal characteristics, are spreading their innovative effects throughout virtually all sectors, including those such as maritime activities, public works, metal-mechanical working, and transport and company services. Taking the textile/clothing and footwear sectors as examples, one can note that these sectors are benefiting from the diffusion of technological innovation developed by technology companies working in such diverse areas as mechanics, ICT, materials, chemicals and biotechnology.

Table 3.27. Distribution of R&D consortia approved by the Innovation Agency, Adl, in the period 2001/2002 by technological intensity levels

Technological Intensity Levels	Number of Participations	Eligible Investment	Total Public Support
Low	44,3%	30,6%	29,1%
Medium-low	6,3%	2,5%	1,9%
Medium-high	12,5%	9,5%	9,6%
High	37,0%	57,4%	59,4%
<i>Total</i>	<i>100,0%</i>	<i>100,0%</i>	<i>100,0%</i>

Source: Adl, November 2002

Table 3.28 – Distribution of R&D consortia approved by the Innovation Agency, Adl, in the period 2001/2002, by application area

Technological Areas								(%)
	Application Sectors	Agro-food	Biotech.	Chemical	Mat + Civil En	Mechanics	ITC	Total
1	Sea	0,8					3,4	4,2
2	Agro-food	8,4	2,5	0,8				11,8
3	Environment			0,8			1,7	2,5
4	Health		7,6	1,7	0,8		2,5	12,6
5	Chemicals			2,5				2,5
6	Plastics			0,8	1,7	0,8	1,7	5,0
7	Wood +Cork			1,7			0,8	2,5
8	Construction				3,4		2,5	5,9
9	Textiles / Clothing Footwear		0,8	2,5	0,8	2,5	0,8	7,6
10	Metal working				0,8	0,8		1,7
11	Mechanical				2,5	1,7	2,5	6,7
12	Transport Equipment				0,8	4,2		5,0
13	Electronics+Instruments.				1,7	1,7	1,7	5,0
14	Software						7,6	7,6
15	Telecom						10,1	10,1
16	Transport						4,2	4,2
17	Other Services						5,0	5,0
	<i>Total</i>	9,2	10,9	10,9	12,6	11,8	44,5	100,0

Source: Adl, November 2002

It should be noted that 30% of the R&D consortia funded through AdI (by number) were undertaken in collaboration with S&T companies and institutions from other countries, within Europe, but also from America and Asia. The international projects accounted for more than 44% of the eligible investment expenditure and when this is set against the number of projects it can be seen that these projects were larger than average. Furthermore, about 22% of the projects were led by multinational companies, or companies with significant foreign-owned share capital. This significant presence of companies with foreign capital is a good indication of the trend that has been seen for the up-grading of foreign investment in Portugal. Adding the two percentages (and subtracting the effect of the intersection of the two types of internationalisation) one finds an internationalisation rate of 45% (measured by the number of projects) and 56% (by the relative importance of the investment sums involved).

Table 3.29 – Distribution of R&D consortia approved by the Innovation Agency, AdI, in the period 2001/2002 in terms of the level of internationalisation

Distribution of N° of Projects				Distribution of eligible expenditure			
Source of Capital*				Source of Capital*			
Project Context	National	Foreign	Total	Project Context	National	Foreign	Total
National	55,5%	14,3%	69,7%	National	44,2%	11,4%	55,7%
International	22,7%	7,6%	30,3%	International	34,2%	10,1%	44,3%
Total	78,2%	21,8%	100,0%	Total	78,5%	21,5%	100,0%

Classification of proposing company

Against the background of these initiatives, the process of technology transfer in Portugal has consistently been considered from a short-term perspective, based on specific contracts, mainly of a consultancy nature. Today, it is clear that science and technology cannot be promoted independently of an innovation policy and that in turn innovation determines and is determined by the market. However, it is also clear that research and innovation are structurally distinct activities, each with its own incentives, which are complementary but not interchangeable. While it is necessary to be aware of the reality in Portugal and its lag in science, technology and innovation compared to the European average, the important changes in progress should not be forgotten, particularly in terms of the internalisation of a “culture of monitoring and accountability”, as well as the international recognition of the enormous potential for expanding research activities and technological development. Against this background, any consideration of the opportunities available to Portugal, must reflect on the need for a “culture of change” and of rigour, thus fostering quality in the light of increasing numbers of Portuguese PhDs, which continue to rise at rates far higher than the European average.

In many evaluation reports produced over the last years by FCT, there is mention that various coordinators of research units often referred to the difficulty in implementing intellectual property protection mechanisms as a way to promote scientific impact and ensuring institutional integrity of the R&D units and the university. The main obstacle identified was a deficit in administration competences and technology commercialisation, but it was above all related to the problem in defining market strategies and connections with large companies that helped launch new technology-based companies. The analysis of the data provided by one of the Portuguese engineering schools, IST (AURIL, NUBS, 2003), shows that between 1995 and 2003, 4.1 patents per year were submitted through this service, of which 2.37 were international patents and 1.75 national patents. These figures contrast with the average of 7.5 patents submitted in 2002, by 98 English universities (*ibid*), where the links between the universities and the productive sector are more intense. But the weak submission of patents is also due to the low competences

of technology commercialisation and, above all, to the diffusion of innovation that today demands expert structures. For instance, a case usually referred to in the literature consists in the evolution of the Technology Licensing Office of MIT that today employs about 30 experts, most of whom have technical training, with special focus on engineering areas, and professional experience in industry. Thus, the commercialisation of patent portfolios, together with market strategies can be promoted. It is evident that organisational practices and institutional incentives play a relevant role in the effective technology transfer processes, so that institutional policies should focus on:

- The competences and the capacities of technology transfer offices;
- The incentive systems that are inconsistent with a more dynamic and pro-active attitude;
- The encouragement of faculty, researchers and postgraduate students in terms of their entrepreneurial potential capability and the development of new technology-based business projects.

Private research financing

Both business and public funding for R&D activities in Portugal, taken as a proportion of the GDP, have grown, although not always steadily, since the mid-1980s. In the second half of the 1990's, the number of companies active in R&D doubled. Analysis has shown that there are two main, inter-linked sources of restrictions to the kind of financing R&D and innovative activities receive from the business sector in Portugal.

The first of these sources has to do with the relatively low levels of in-house R&D done by most Portuguese industrial firms, which are particularly small in size, as well as with their concentration in activities that are mostly into mature stages of their life-cycles. The largest companies (namely in the energy, telecom, transports and construction sectors) invest relatively small amounts of resources in R&D.

This leads to a second source of restrictions: since Portuguese firms are unable to absorb, and therefore finance the development of a large part of the R&D results generated by universities and research institutions, new firm start-ups and technology-based entrepreneurship need to assume a stronger role in introducing new innovations to the market, and creating jobs. While Portugal has a large proportion of SMEs, entrepreneurial activity (i.e. the proportion of people engaged in new firm start-ups) is relatively low, and concentrates mostly on micro-firms (less than 10 employees) that are unable to grow significantly.

An additional point worth addressing is that many evaluation panels that visited Portugal in the last years noted that direct funding from industry was on a small scale, and that it had had no significant impact on the quality of research and has been used almost exclusively for short-term goals and for technological development. Examples of actions suggested by the evaluation panels include the establishment of: i) monitoring committees for research centres and state laboratories, to include representatives from the business world; ii) cooperation networks, supported by public funding; iii) exchange mechanisms for teachers, researchers and students.

Furthermore, as the industrial base in Portugal is mostly composed of small enterprises and many micro enterprises, this corresponds to quite low levels of education of many entrepreneurs.

Table 3.30: Percentage of GERD financed by Industry

	Percentage of GERD financed by Industry		
	EJ (25)	EU (15)	Portugal
1993	:	52.44 (e)	
1994	:	52.54 (e)	
1995	51.92 (e)	52.17	19.47
1996	52.19 (e)	52.46 (e)	
1997	53.32 (e)	53.67 (e)	21.24
1998	53.95 (e)	54.34 (e)	21.23 (e)
1999	55.15 (e)	55.63 (e)	21.32
2000	55.62 (e)	56.21 (e)	27.05 (e)
2001	55.36 (e)	55.99 (e)	31.54
2002	:	:	
2003	:	:	

Source: Eurostat

Table 3.31: Business enterprise expenditure on R&D, BERD

	Business Enterprise Expenditures on R&D (BERD)		
	EU (25)	EU (15)	Portugal
1993	:	1.01	:
1994	:	0.99	:
1995	0.96	0.98	0.11
1996	0.95	0.98	:
1997	0.97	1.00	0.13
1998	0.98	1.01	
1999	1.03	1.06	0.16
2000	1.05	1.08	
2001	1.06	1.11	0.27

Source: Eurostat

Promoting academic research

Within the context of the present analysis, mention should be made to the process of building a science community under international reference terms, as initiated during the second half of the nineties, where the consecutive international evaluations of S&T institutions carried out since 1996 have imposed a dynamic of change within the university community and, above all, a considerable enthusiasm resulting,

undoubtedly, from the fast increase in the presence of young doctorates and of PhD students, as well as a high expression of international connections.

In fact, the continuous increase in the number of doctorates, especially when considering European and international figures, was systematically referred to by the generality of the evaluation panels as a decisive factor. However, in 2003, the number of researchers in terms of the active population represented still only half of the European average (2.9 and 4.9, respectively for every thousand inhabitants) and analysis led review teams to indicate the need for structural actions, including:

- Reinforce infra-structural aspects, including the support to libraries and the widespread electronic access to documentation centres, and fast and efficient access to the Internet.
- Intensify the technical and administrative support that continued to be below the European average when analysed in terms of the personnel per researcher (respectively, 3.9 and 9.5 for every thousand inhabitants), but also because of its reduced quality in most cases.
- Complement the current lines of public R&D funding with thematic programmes of multi-disciplinary nature, to be naturally associated with national priorities, namely with reference to the large public investments of coming years (e.g., information society, telecommunications, transports, as well as public risks). It is important to note the structuring nature these types of programmes can have, namely to promote the connection of the scientific community to the civil society.
- Facilitate the scientific activity within knowledge integrated communities and networks that stimulate institutional relationships, not only between academic centres, but also between these centres and other actors, namely State Laboratories, secondary schools and companies. The valorisation of those scientific-based networks, in addition to decreasing the effects related with the reduced dimension of the units, should certainly promote the creation and diffusion of new knowledge, motivating the scientific development in a context of continuous change and growing internationalisation of the scientific base.
- Privilege the national and international mobility of researchers, primarily valuing the European area in a context of effective need to promote the internationalisation of the research community.
- Implement coherent protective measures of intellectual property as a way to promote scientific impact, in addition to preserving its institutional integrity, in a context of growing importance of innovation as a critical factor of economic development.
- Develop own competences at the level of technology management, in addition to the reinforcement of strategies that promote links with companies and the release of new technological-based companies.

The evaluation reports produced over the last years are clear when discussing the implementation of measures, such as for promoting the Portuguese scientific and technological development, where their effectiveness was strongly conditioned by structural deficiencies in the organisation and constitution of the majority of the units, particularly in their *relationship with universities*, including:

- A deficient articulation between education and research, requiring an improved partition of the workloads of teachers and students, considering not only the distribution of the academic schedules, but above all, the valorisation of post-graduate education and of the research activities in the structure and organisation of the universities.

- Relative ageing of research and university personnel, demanding the adoption of rejuvenation policies and the integration of young researchers, in a way that allows the valorisation of their careers, the materialisation of the fair aspirations of promotions of the younger teachers/researchers, the integration of new doctors, and the promotion of a dynamic of international world-wide collaboration with centres of excellence.
- Insufficient support structures, in a way that requires reinforcement, and the adoption of development strategies and flexible approaches for university operation.

As pointed out by the Evaluation Panel in the area of Mathematics in 2000, “it is not the education mission that is being challenged or questioned, but the lack of flexibility in recruitment and in the management of teaching duties of each faculty member”. Generally, many of these comments confirm the observations made in several reports drawn up in the context of the evaluations conducted in 1996, 2000 and 2003. In fact, the need to promote the link between university R&D units and society and with companies in particular has been mentioned. Although these aspects were particularly applicable to the areas of Exact Sciences, Engineering/Technology Sciences, Natural Sciences and Health Sciences, it has been systematically mentioned the need to promote scientific-based cooperation and national and international mobility, within the European area, as one of the processes to get past difficulties of relationship with the hosting institutions.

It is also imperative to refer that many of the evaluation panels that visited Portugal over the last years concluded that the direct funding by industry, reduced as it was, had not had a significant impact on the quality of the research and has been, almost exclusively, used for short term purposes and at the level of technological development. Actually, the analysis shows that the current situation was primarily due to the absence, in the past, of integrating science and technology policies, and it required making a priority the promotion of collaboration forms between research centres and the entrepreneurial reality.

The recent European report on the “Benchmarking the promotion of RTD culture and Public Understanding of Science” (Miller et al., 2002) acknowledges the leading role of the “Ciencia Viva” programme implemented in Portugal since 1996, but it also recognises the still difficult climate for promoting science culture in Portugal. Although the country is commonly characterised for its low science literacy levels, it is interesting to note the increasing participation trend in science and technology courses, as illustrated in Figure 3.21. This has been called the “Ciência Viva Effect” and reflects the openness of the Portuguese society to measures associated with science culture. In fact, the continued implementation of actions fostering “science for all” is a practice to follow, where the role of the Ministry of Science, Technology and Higher Education appears particularly suitable to facilitate the joint enrolment of researchers and basic and secondary schools in specific projects driving society at large. It is clear that this requires new knowledge about social behaviours, as well as new methodological developments, namely at European wide level, and the work of “Ciência Viva” programme provides important guidelines to help promote a “Portugal of knowledge” in a fast moving environment.

Figure 3.21 – Students enrolled in secondary education (10th to 12th grades) in Portugal for 1996-2004, per type of studies

Source: Conceição and Heitor (2005); Primary data from DAPP, Min. Education

Figure 3.23 – Percentage of students enrolled in secondary education (10th to 12th grades) in Portugal for 1994-2004, as function of the type of studies

Source: Conceição and Heitor (2005); Primary data from DAPP, Min. Education

Note: key as in Figure 3.22

Research financing by the Foundation for Science and Technology

The Fundação para a Ciência e Tecnologia (FCT – Foundation for Science and Technology) is currently dependent on the Ministry of Science, Technology and Higher Education. FCT's mission is to promote the advancement of scientific and technological knowledge in Portugal, exploiting and fostering opportunities with the potential to meet the highest international standards for the creation of knowledge in different domains. Its task is also to stimulate suitable dissemination and absorption of such knowledge, thereby contributing towards the sustained strengthening of the quality of life and standard of living of the population, seeking to increase their respective endogenous capacities for producing wealth and expanding the country's cultural potential.

FCT's mission is mainly carried out through the award of funding, decided upon after considering the merits of the proposals submitted for its approval, which are usually promoted by scientific institutions, research teams or duly qualified citizens. Such a process normally takes the form of public tenders specifically requested for this purpose. Consideration is also given in this area to other forms of support in partnership with both public and private institutions.

FCT's participation in the funding of the Sistema Científico e Tecnológico (SC&T – Scientific and Technological System) follows the policies established for the sector at both a national and European level.

In order to carry out this mission, FCT enjoys the support of six Scientific Councils, acting in an advisory capacity, each of which is composed of people of recognised merit in their respective scientific area.

In strategic terms, FCT's mission centres around certain key areas of intervention, established in keeping with five main guidelines:

Promotion of advanced human resources training, through the continued funding of postgraduate awards, mainly for the preparation of doctorates and post-doctoral research; Besides individual awards, FCT also provides scholarships for researchers involved in research projects and working at R&D units; This area of intervention is of crucial importance for the country, since training and advanced qualification are frequently highlighted as one of the main impediments to the implementation of the SCT&I.

Funding of scientific research and technological development projects in all scientific areas, financed by national and Community funds, as well as in strategic areas and in relation to specific themes that are of particular importance for Portuguese society. The assessment of applications consists of a process of *ex-ante* appreciation by mainly foreign peers. The implementation of projects is also closely monitored with a view to optimising results. In parallel with national programmes and European structural support, FCT is increasingly involved in ensuring the integration of its programmes for the funding of projects within the European space, in keeping with the concept of "open coordination" that is included in the Lisbon Strategy. This integration has been carried out in a gradual and selective manner in the coordination programmes reserved for national funding agencies, implemented both under the scope of the European Union Framework Programme for Research and Technological Development, the ERA-NETs, and under the scope of the European Science Foundation, namely the EUROCORES. Mention should also be made of the funding afforded to the work of teams involved in multilateral cooperation activities, under the scope of international organisations of which Portugal is a member, such as CERN, ESO and ESA.

Support for the development and management of R&D infrastructures through a funding programme based on a model whose criteria depend on the results of external assessment. This will take into account the levels of scientific activity and knowledge transfer. This area of intervention is subject to criteria of economic, social and cultural relevance, favouring the development of a critical mass, the creation of networks, and the internationalisation of research and innovation, particularly when linked to the business world. Associate Laboratory status has been awarded to those R&D infrastructures whose scientific development is considered excellent by international standards, showing a high performance capacity and providing support in the formulation and implementation of public policies. This area of intervention includes the modernisation of the infrastructures of public research institutes.

Promotion of the mobility of researchers involves the publicising of research opportunities in national and foreign organisations through the national mobility portal, **Astrolabium**. The creation of this portal is included in the implementation in Portugal of the European Commission's Mobility Strategy, which seeks to give an international dimension to scientific careers and develop the mobility of researchers between the academic world and the business world.

Promotion of scientific communication through the funding of a series of activities aimed at promoting communication between scientists and disseminating the national scientific production: participation at scientific meetings, production of scientific periodical and non-periodical publications and funding of scientific societies. FCT is also associated with different scientific prizes that recognise the value and merit of the work undertaken by researchers and help to make this known to the general public.

In conclusion, FCT sees its strategic responsibility as ensuring the achievement of the great objectives of the national policy for Science and Technology, in keeping with a perspective that includes consolidation, growth, sustainability and the international affirmation of the skills and capacities of the Portuguese scientific and technological community.

The overall financing of the FCT for the period between 1995 and 2005 can be seen in the following Table. Column (1) reports to overall investment payments and column (2) reports to current expenses with the FCT. The total corresponds to the overall financing of FCT.

Table 3.32: Overall Financing of FCT

€

YEAR	INVESTMENT	OPERATION	TOTAL (1 + 2)
	PIDDAC (1)	CURRENT EXPENSES (2)	
1995	62 120 319.62	9 945 097.42	72 065 417.03
1996	73 232 737.27	13 129 619.26	86 362 356.53
1997	79 972 868.62	11 392 438.55	91 365 307.17
1998	113 635 484.72	9 943 538.57	123 579 023.29
1999	114 025 643.33	9 359 015.33	123 384 658.66
2000	137 125 784.20	7 012 338 .66	144 138 122.86
2001	175 270 390.31	7 181 382.13	182 451 772.44
2002	174 265 347.25	5 669 870 .94	179 935 218.19
2003	124 096 254.21	13 461 629.57	137 557 883.78
2004	159 865 692.34	21 762 330.74	181 628 023.08
2005	196 524 326.00	21 891 466.00	218 415 792.00
TOTAL	1 410 134 847.88	130 748 727.16	1 540 883 575.04

Table 3.33 identifies the amount of R&D which is financed by the Foundation for Science and Technology. The first part is presented by Scientific Council and includes the amount attributed through competitive based research projects. There is also the amount attributed to fellowships and advanced training and by last there is the amount attributed to research centres and associate labs.

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Table 3.33: Main Programs of FCT Funding for Research and Development (a)

Programs	2000	2001	2002	2003	2004	2005
FCT Funding of Research Projects	9 281 747.22	21 835 801.15	33 005 582.17	25 489 747.50	24 800 935.90	28 709 005.99
Biology and Biotechnology	1 641 674.57	4 275 253.98	6 178 161.96	4 068 667.86	4 112 856.06	5 105 876.13
Engineering Sciences	2.848.176.04	4 842 592.40	8 532 304.54	7 066 312.88	8 375 084.50	7 338 046.93
Health Sciences	539 270.39	3 058 527.81	4 912 131.00	3 759 759.00	3 119 822.35	4 186 622.01
Earth and Space Sciences	442 333.99	1 281 872.88	1 594 861.12	1 194 671.00	1 036 037.50	2 216 420.58
Marine and Environmental Sciences	1 757 823.64	2 707 016.14	1 866 759.28	1 782 165.45	577 607.19	1 782 114.68
Exact Sciences	1 261 260.39	2 853 560.97	4 887 754.27	3 711 779.00	3 917 866.41	3 727 635.89
Social Sciences and Humanities	791 208.20	2 816 976.97	5 033 610.00	3 906 392.31	3 661 661.89	4 352 289.77
FCT Funding for Fellowships	47 707 008.00	53 693 889.00	61 507 795.00	68 758 307.00	73 414 101.00	82 809 828.00
Biology and Biotechnology	8 632 314.00	10 449 711.00	12 234 774.00	13 560 398.00	13 227 877.00	14 393 058.00
Engineering Sciences and architecture	7 922 829.00	8 488 558.00	9 909 302.00	11 340 363.00	12 580 150.00	15 834 556.00
Health Sciences	6 497 336.00	7 099 580.00	7 916 796.00	9 048 378.00	10 406 361.00	12 090 354.00
Earth and Space Sciences	887 173.00	1 097 550.00	1 501 049.00	1 644 649.00	1 799 052.00	2 218 097.00
Marine and Environmental Sciences	2 485 928.00	3 356 850.00	4 338 780.00	5 152 067.00	5 845 867.00	6 320 195.00
Exact Sciences	8 765 335.00	9 235 632.00	10 279 513.00	11 663 050.00	12 535 440.00	12 965 833.00
Social Sciences and Humanities	12 516 093.00	13 966 008.00	15 327 581.00	16 349 402.00	17 019 354.00	18 987 735.00
FCT Funding for Research Centres and Associate Labs	(b)	(b)	(b)	17 582 744.60	56 481 164.04	56 074 224.54
Biology and Biotechnology	(b)	(b)	(b)	340 248.54	1 273 842.13	1 010 572.98
Engineering Sciences and architecture	(b)	(b)	(b)	6 694 599.68	19 807 536.58	19 303 549.74
Health Sciences	(b)	(b)	(b)	3 463 566.91	8 941 198.51	10 892 697.49
Earth and Space Sciences	(b)	(b)	(b)	422 903.47	1 592 008.44	1 772 237.65
Marine and Environmental Sciences	(b)	(b)	(b)	938 780.80	2 785 113.13	3 003 028.74
Exact Sciences	(b)	(b)	(b)	2 562 .940.52	11 047 998.15	10 276 150.05
Social Sciences and Humanities	(b)	(b)	(b)	3 159 704.68	11 033 467.10	9 815 987.89

(a) The three sub-totals do not accomplish the total funding of FCT, according to table 1. The remaining part includes: Current Expenses (21M€ in 2005, according to table 1), researchers mobility, organisation of international scientific conferences, participation in international projects, international relations, R&D projects with university and companies cooperation, promotion of scientific culture and other programs with less expression in total funding.

(b) Not presented here because of different methodology used in the process of gathering data.

Tables 3.34 and 3.35 provide information on the distribution of FCT funding and human resources.

Table 3.34: Distribution of total FCT funding for R&D by field (2003-2005)

	2003	2004	2005
Biology and Biotechnology	16%	12%	12%
Engineering Sciences	22%	26%	25%
Health Sciences	15%	15%	16%
Earth and Space Sciences	3%	3%	4%
Marine and Environmental Sciences	7%	6%	7%
Exact Sciences	16%	18%	16%
Social Sciences and Humanities	21%	21%	20%
Total	100%	100%	100%

Table 3.35: Human resources registered at Research Centers and Associate Labs per field (status 31/12/2005)

	Researchers		PhD	
	Head Count	%	FTE	%
Biology and Biotechnology	2 739	13%	1 204	8%
Engineering Sciences	5 718	27%	2 507	16%
Health Sciences	2 549	12%	1 056.75	7%
Earth and Space Sciences	665	3%	665	4%
Marine and Environmental Sciences	1 368	6%	1 368	9%
Exact Sciences	2 622	12%	2 622	17%
Social Sciences and Humanities	5 825	27%	5 825	38%
Total	21 486	100%	15 247.75	100%

Table 3.36 provides the number of PhDs attributed or recognised by Portuguese universities from 1970 to 2005 by scientific fields. The high growth rates of certain fields such as Biological Sciences, Health Sciences and Computer Sciences are evident. The attraction to science fields contrasts with a general trend throughout most of Europe where young people seem to shy away from science.

The general increase in PhDs can be largely attributed to the fellowship policy practiced by the FCT. The Foundation for Science and Technology attributes fellowships for PhDs in Portugal and abroad. Between 2000 and 2005 the FCT attributed over 12,000 fellowship grants for Masters, PhDs and post-docs.

The current Government Programme has defined as an objective for the legislature to increase the number of new PhDs per year in Portugal and abroad from about 1000 to 1500. This indicates that funding for PhD grants and fellowships will continue to increase.

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Table 3.36: PhDs completed or recognised by Portuguese universities, by scientific field, by year, 1970-2005

	1970-1979	1980-1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Mathematics	31	134	20	21	24	25	26	27	23	27	31	35	48	37	42	58	61	63	733
Physics	77	155	16	25	12	33	23	25	34	26	44	29	40	38	54	57	36	55	779
Chemistry	87	116	15	9	21	32	31	35	50	44	41	37	51	53	52	49	47	64	834
Biological Sciences	33	114	23	31	27	40	36	55	59	75	64	60	74	86	90	110	89	136	1.202
Earth and Space Sciences	30	44	13	10	12	9	10	26	14	24	22	27	45	63	38	41	41	35	504
Agrarian Sciences and Veterinary	56	136	32	13	25	23	28	24	17	21	38	39	34	20	55	39	41	38	679
Health Sciences	145	301	47	43	47	58	57	74	70	75	73	89	84	85	78	67	76	81	1.550
Mechanical Engineering	28	92	16	12	9	17	17	16	24	20	22	23	22	25	31	35	44	53	506
Material Sciences and Engineering	6	33	6	6	4	10	10	7	13	12	11	21	16	13	16	12	18	22	236
Civil Engineering and Mining	24	98	13	9	18	19	16	24	24	28	21	32	21	19	30	23	41	29	489
Biochemical Engineering	-	9	1	7	2	4	3	13	13	11	22	21	21	16	35	33	30	20	261
Chemical Engineering	47	107	10	15	9	21	14	19	32	19	26	21	18	20	31	26	28	33	496
Electrical Engineering and Computer Science	38	153	22	17	24	28	30	44	55	36	57	67	55	80	82	90	111	106	1.095
Economics	21	130	9	20	19	22	19	20	21	15	28	19	33	40	45	30	33	32	556
Management	-	15	1	5	4	3	8	15	7	9	14	16	24	22	24	35	46	53	301
Law	17	14	7	6	5	3	3	5	8	7	12	11	13	18	15	24	17	21	206
Political Science	2	12	3	1	4	2	1	1	-	1	3	5	4	9	7	7	11	7	80
Sociology	9	37	7	3	9	7	13	10	15	6	9	17	20	29	27	30	39	49	336
Demography	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2
Anthropology	-	18	1	3	2	3	9	11	13	7	5	9	7	9	13	19	13	10	152
Geography	8	17	2	3	-	9	2	8	4	4	4	12	7	6	11	8	8	11	124
Education Sciences	9	56	10	10	15	29	28	24	34	25	44	46	32	52	43	49	57	58	621
Psychology	4	37	7	11	11	19	13	20	13	23	16	22	35	30	26	30	36	39	392
Linguistics	9	29	7	4	3	3	8	3	6	9	8	13	22	17	11	19	19	17	207
Communication Sciences	1	4	1	2	-	2	2	2	3	2	6	8	5	7	11	15	12	9	92
Philosophy	24	34	10	7	10	9	5	6	9	4	10	12	12	13	25	9	16	17	232
History and Archaeology	30	70	15	10	16	31	14	28	24	28	32	27	43	28	20	40	49	52	557
Architecture and Urbanism	2	2	7	3	2	12	7	11	3	10	3	10	11	10	19	13	9	10	144
Literature	30	93	16	13	16	20	16	12	19	20	44	38	53	53	33	46	38	42	602
Art	2	4	-	-	1	-	4	6	1	2	8	6	9	8	20	11	14	15	111
Total	770	2.065	337	319	351	493	453	571	608	590	718	772	860	906	984	1.025	1.080	1.177	14.079

Sources: Observatório da Ciência e do Ensino Superior, Doutoramentos realizados ou reconhecidos por Universidades Portuguesas, Maio 2006

Diário da República (II Série): Listagem semestral dos diplomas do grau de doutor obtidos no estrangeiro e reconhecidos em Portugal ao abrigo do DL nº216/97, de 18 de Agosto.

Direcção-Geral do Ensino Superior: Registos do grau de doutor obtido no Instituto Universitário Europeu de Florença ao abrigo do DL nº93/96, de 16 de Julho.

Capital/Investment funding in higher education institutions

Priority for capital investment in higher education institutions is determined on a case-by-case basis without reference to multi-year planning or priority assessment-based studies. Nevertheless, priority was assigned to capital investment in the health sciences through a multi-year planning for medical schools. For all other fields assessment occurred on a case-by-case basis. The introduction of a competitive process for assessing capital outlay of public funding whereby priorities that would be publicly evaluated and determined on a comparative basis is expected in order to organise and rationalise this process.

The EU Structural Funds for 2007 – 2013 have been approved and can therefore be seen as stable for that period of time. Following the approval of the Structural Funds there is a separate decision for allocation of those funds. Universities spend on current expenses with personnel and with “other” expenses. Within the “other” expenses there are maintenance and administrative expenses. There are also expenses incurred with infrastructure such as buildings and equipment.

As previously indicated in the Background Report higher education institutions have a net balance of around 15%. The reasons for this have a lot to do with the necessary accounting involved with managing academic years within a fiscal year accounting procedure.

The procedures involved with the Auditors Court are conducted as a required annual exercise for all public bodies, including higher education institutions. The Auditors Court can further conduct audits in particular cases. Capital expenditure always requires previous approval by the Auditors Court.

Universities and other higher education institutions must also submit monthly requests to the Ministry of Finances for the release of funds for their current expenses (such as the salaries of teaching and administrative staff).

Admission to Higher Education

In 1988 the Ministry of Education determined to increase enrolment in higher education. This was a major policy objective. To increase the number of candidates the Ministry decided that entrance examinations for higher education were to be used only for ranking students in the national tender for places in higher education, without minimum marks. This meant that any student completing upper secondary education could enter higher education without any additional barriers provided there were vacant places. This raised some concerns about quality as at the time there were no national examinations at the end of upper secondary education. The exams for Access to Higher Education revealed that in some cases there were large discrepancies between the grades obtained at the examination and the grades given by the schools at the end of secondary education.

Indeed the idea of the entrance examinations was to compensate for the differences in criteria used by the different schools. The decision of the Ministry was to allow students to enter higher education, even with 0 marks in the entrance examinations, provided there were vacant places. This almost doubled the number of candidates seeking admission.

By 1996 the participation rate was over 40% and due to the extremely fast development of the system questions were raised about its quality and the government policy changed from a paradigm of expansion to one of consolidation and quality. Therefore the government decided to reintroduce national exams at the end of upper secondary education. Students can complete their studies provided that a weighted average (30% from national examinations) of the marks of national examinations and school marks is over 9.5 out

of 20. As, in general, school grades are higher than national examination marks, a student can complete upper secondary education with marks below 99.5 in the national examinations.

The grades of these national examinations are also used to rank students applying for a place in higher education. However, the Ministry has progressively enforced the rule that students entering higher education must have grades above 9.5 in those disciplines that are considered fundamental to enter a particular programme. For instance, a student in Electrical Engineering needs to have at least 9.5 in Mathematics and Physics to be allowed to register. From 1996 to 2003 the Ministry put pressure on institutions to raise the entrance standards, but then, in 2003 a new law enforced the use of minimum marks. This measure was introduced by a 2003 decree-law.

At present the concern lies with an installed overcapacity of the system: the number of candidates has been falling and many vacancies are not filled even if students have completed upper secondary education but they cannot register because they do not have minimum marks.

For each of their 1st cycle courses higher education institutions must choose one or two subjects as access examinations (“provas de ingresso”).

They can choose the subjects as one single set or as two or more alternative sets.

Examples:

Mathematics (one subject)

Mathematics and Physics (two subjects)

Mathematics or Physics (one subject to choose between two)

Mathematics and Physics or Mathematics and Chemistry (two subjects, to choose between two sets)

The subjects are chosen among a list set by Comissão Nacional de Acesso ao Ensino Superior.

To apply to a 1st cycle course students must pass national examinations on the subjects chosen by the institution with a minimum score fixed by the institution. For some 1st cycle courses students must fill some prerequisites (pré-requisitos), *i.e.*, must satisfy to some special skills (physical or artistic) determined by the institutions. These requirements are for students leaving secondary education.

Adult applicants, (23 years and over) are submitted to (i) a curriculum analysis; (ii) an interview; (iii) a written and or practical examination on subjects defined by each institution.

The main reason for introducing the minimum admission national score was to ensure the quality of the students entering higher education as well as increasing concern with falling standards. As higher education institutions sought to attract students irrespective of their acquired competencies, the Ministry sought to impose more rigour through minimum standards (95 out of 200).

Table 3.37: Duration of Academic Programmes – Before and After Bologna**Before Bologna**

Degree	Duration	Obs.
Bacharelato	3 years	Bachelor's degree License (FR)
Licenciatura	4, 5 years depending on the subject (v.g. Management, Economics, Literature, Nursery: 4 years; Engineering, Veterinary, 5 years) 6 years for some special cases (v.g. Medicine, Dentistry)	Bachelor's degree with Honours Maîtrise (FR)
Mestrado	2 years after licenciatura: usually, course: one year; dissertation: one year	Master's degree
Doutoramento	No fixed duration: 3 or 4 years average.	Ph. D.

In polytechnics most courses integrate *bacharelato* and *licenciatura* on a two cycle set: 3 years (*bacharelato*) + 1 to 2 years (*licenciatura*).

After Bologna

Degree	Duration	Obs.
Licenciatura	180 ECTS, 3 years (in universities and polytechnics) 240 ECTS, 4 years (universities and, in some special cases, in polytechnics)	1st cycle. See articles 8 and 9 of decree-law 74/2006 (annex)
Mestrado	90 to 120 ECTS, 3 to 4 semesters (in special cases 60 ECTS, 2 semesters)	2nd cycle See article 18 of decree-law 74/2006 (annex)
Doutoramento	No fixed duration: 3 or 4 years average.	3rd cycle

NOTE: In some special cases 1st and 2nd cycles are integrated in a single course (integrated master). See article 19 of decree-law 74/2006 (annex).

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PART III.3 - A CAPACITY ANALYSIS

The Portuguese higher education system has gone through a process of rapid expansion until 2002. Large investments were made in the qualification and expansion of the number of academic and non-academic staff and in new facilities. In this context, this chapter analyses the capacity installed and its relative adequacy to the labour market and to the present rates of total enrolment.

1. The academic and teaching staff

Table 3.38 quantifies the 2004/05 student/teacher ratios in public universities and polytechnics, which present average values of 14 (as calculated on the basis of FTE teachers). This compares with other European figures, as discussed in Part I of this report, although in Portugal staff qualification levels are lower. However, it should be noted that the overall student/academic staff ratio in terms of head counts is 10.4 for the whole system, with ratios equal to 11.6 for public universities, 10.4 for public polytechnics and 8.8 for the private sector. In any case, the results suggest that attention should be paid to factors that can improve the efficiency of the system, such as the level of qualification of the academic staff, the excessive number of courses and institutions with very low number of students, as well as in some cases an excessive number of weekly direct contact hours.

The situation changes when examining the qualification of the academic staff because the percentage of staff with a PhD is still low by international standards. Table 3.39 shows that the number of the academic staff in public universities with a PhD has been steadily increasing over the last decade, although it still represents only about 55% of the total number of university teachers.

It should be noted that the growth in the number of PhDs was largely based on “in-house” training programmes and, as can be seen in Figure 3.22, to the high inbreeding rate of Assistant Professors at the two largest Portuguese engineering schools, namely at the Instituto Superior Técnico of the Technical University of Lisbon and at the Faculty of Engineering of the University of Porto. Inbreeding does not allow structural changes, nor does it often permit new approaches to scientific research and education problems. It has in fact been internationally recognised (European Commission 1995) as an obstacle to the diffusion of new forms of organisation and knowledge. Although inbreeding is not exclusively a Portuguese problem, Spain also shows a very high inbreeding rate, around 95% (Navarro and Rivero 2001). On the other hand, countries like the United Kingdom have an inbreeding rate of only 17%, as high faculty mobility has been developed throughout decades. Despite these facts, it is worthwhile mentioning that PhD researchers mobility mainly occurs under the scope of R&D units, often at post-doctoral researchers’ level. This fact strengthens the critical role of R&D units because it helps the institutionalisation of mobility in the scientific community. Indeed, it was the growing number of young PhD holders in research units that led the international evaluation panels of R&D units, to consider that there were dynamics of change. Nevertheless, these dynamics had little impact on the university structure.

Table 3.38 – Ratio of students to teaching staff in higher education Portuguese institutions in 2004/05, calculations based on full-time equivalents

	Students (total)	Teaching Staff (FTE)	Students per teacher
U.ALGARVE	9 116	619	15
U.AVEIRO	11 702	838	14
U.B.I.	5 273	406	13
U.COIMBRA	19 872	1 317	15
U. EVORA	8 384	573	15
U.LISBOA	20 411	1 517	13
U.MINHO	15 707	1 084	14
U.N.L.	14 840	999	15
U.T.L.	21 802	1 616	13
U.PORTO	26 387	1 841	14
U.T.A.D.	6 603	547	12
I.S.C.T.E.	5 739	373	15
U.AÇORES	3 342	260	13
U.MADEIRA	2 735	185	15
TOTAL UNIVERSITIES	171 913	12 175	14
IP BEJA	3 227	219	15
IP BRAGANÇA	5 348	439	12
IP C.BRANCO	4 652	328	14
IP CAVADO E AVE	1 447	162	9
IP COIMBRA	9 218	555	17
IP GUARDA	3 543	241	15
IP LEIRIA	9 187	506	18
IP LISBOA	13 992	1 030	14
IP PORTALEGRE	3 342	200	17
IP PORTO	15 395	1 030	15
IP SANTAREM	3 842	256	15
IP TOMAR	3 348	240	14
IP SETUBAL	6 029	450	13
IP V.CASTELO	3 352	257	13
IP VISEU	6 266	399	16
ESUP HOT. TUR. ESTORIL	1 063	47	23
ESC. SUP. ENF. NAO INT.	4 490	381	12
TOTAL POLYTECHNICS	97 741	6 740	15
TOTAL	269 654	18 915	14

Note: Universidade Aberta, the Portuguese distance education institution has been excluded from the analysis given its specificity in terms of student - teacher ratio

Table 3.39 – Academic staff holding a PhD (FTE); public universities

Institution	1993	1996	1999	2001	2002	2003	2004
Azores	34	63	83	101	132	133	142
Algarve	31	76	120	169	187	199	217
Aveiro	137	219	306	358	376	385	394
UBI	23	45	72	95	124	143	166
Coimbra	435	549	678	724	770	783	836
Évora	65	118	176	222	256	277	315
Lisbon	611	803	863	924	942	962	982
Technical	676	895	1006	1 069	1 118	1 141	1 177
New U. Lisbon	325	441	567	618	630	676	674
Minho	161	261	370	462	492	549	608
Porto	631	862	999	1 125	1 149	1 183	1 214
UTAD	52	82	145	196	201	221	245
Madeira	2	25	32	48	49	58	73
Aberta	8	22	36	62	69	77	79
ISCTE	41	84	103	126	141	160	173
Total	3 232	4 545	5 556	6 299	6 636	6 947	7 295

Source: OCES, 2005

Figure 3.22 – Evolution of the inbreeding rate in two engineering schools (Instituto Superior Técnico, UTL, and Faculty of Engineering, University of Porto), for 1990 - 2003

Note: the inbreeding rate is calculated on the basis of PhD holders, who remain in the same institution as assistant professors.

Source: UTL (2005), "Knowledge production and diffusion at UTL 1995(96-2002/03".

Table 3.40 quantifies the number of PhD holders employed in R&D units evaluated with the best classifications, by scientific area. The analysis is further quantified in Figure 3.23 with the relative numbers of eligible researchers holding a PhD in R&D units classified as Excellent and Very Good by Portuguese university. The results show a large disparity across different universities, as explicitly

acknowledged by various review committees in the evaluations carried out through FCT. Many evaluation panels (Heitor 2000) that visited academic research centres mentioned the need to promote the mobility of researchers and professors through limitation of inbreeding processes. This requires further reflection on the structure of doctoral and post-graduate programmes in Portugal. Indeed, evaluation committees systematically pointed to the need to expand the recruitment base and to facilitate placements in post-graduate and post-doctoral programmes abroad, and to promote an effective internationalisation of the scientific community.

Table 3.40 – PhDs in R&D units rated Excellent and Very Good, by scientific area in 2000

Scientific areas	Global figures for Portugal	
	Number of PhDs (FTE) in centres rated as "Excellent" and "Very Good"	Percentage of PhDs in centres rated as "Excellent" and "Very Good"
Mathematics	445	77
Physics	304.25	84
Chemistry	216	74
Earth and Space Sciences	128	57
Marine Sciences	209.5	88
Land Sciences	74	17
Health Sciences	600.5	79
Civil Engineering	79	40
Mechanical Engineering	161.75	64
Materials Science & Engineering	185.25	73
Chemical Engineering and Biotechnology	267	78
Electrical & Computer Engineering	432.75	81
Economics and Management	112	44
Sociology, Anthropology, Geography and Demography	134.75	51
History	145.25	53

Source: FCT

Figure 3.23 – Percentage of researchers in research centres that were rated as “Very Good” and “Excellent” in relation to the total of PhDs per university

Note: Only the research centres belonging to the universities that provided the number of eligible PhD holders per centre in 2000 were considered. The evaluation of the centres was updated according to the evaluation process conducted in 2002.

Source: FCT

The available data for polytechnics (Table 3.41) show that there was a modest career progress in public polytechnics. In 2005 there were 860 PhDs, which accounts for 24% of the staff in the academic career. This can be partly explained by the lack of updating of the number of places (“quadro”) for hiring academic staff. Furthermore, contrary to public universities, the personnel hired under special contracts are quite significant, representing over 50% of the total staff. Moreover, the polytechnic academic career differs from the university academic career in structure and in the number of required teaching hours. The structure differs also in that the major requirement for promotion in the polytechnics has been the master degree, while university careers require a PhD.

Analysis also shows that, from 1993 and 2003, the percentage of Coordinators increased from 5.4% to 7.4%, the percentage of aggregates increased from 17.8% to 25.3%, the percentage of assistants decreased from 24.7% to 13.4%, while the percentage of specially hired staff only slightly increased from 52.1% to 54.0%. This means that the intake of younger people (assistants) has slowed down, while a considerable number of staff members completed their masters’ degree being promoted to “aggregates”.

Table 3.42 presents the available data on the academic staff of private universities and the percentage of staff holding a PhD, together with student/staff ratio for undergraduate studies (which varies between 8.4 and 24.4).

Table 3.41 – Composition and qualification of the public polytechnics' academic staff

Institution	2002/03				2004	
	Coordinator	Aggregate	Assistant	Special	PhDs	Masters
Univ. Algarve*	19	103	30	201	38	193
Univ. Aveiro*	5	24	8	110	12	82
Beja	17	85	44	93	17	146
Cávado e Ave	1	9	18	42	6	31
Bragança	15	130	159	162	73	184
C. Branco	23	112	78	132	41	184
Coimbra	24	159	64	423	76	254
Guarda	18	81	79	91	27	151
Leiria	16	98	120	364	50	223
Lisboa	86	210	29	638	119	372
Portalegre	6	48	11	140	24	88
Porto	86	187	84	599	134	460
Santarém	23	99	53	116	28	161
Setúbal	23	118	24	328	54	254
Viana Castelo	17	74	34	144	43	166
Viseu	36	83	33	281	46	208
Tomar	26	54	34	145	23	103
Health sector**	135	297	141	200	49	403
TOTAL	576	1971	1043	4209	860	3663

Source: DGES, 2005. *Only polytechnic schools **Nursing schools integrated in the local polytechnic

Table 3.42 – The number of academic staff members (FTE), private universities (2005)

	Ph.D.	Masters	No P.G.	Total (1)	%Ph.D.	Students (2)*	Ratio (2)/(1)
Católica	405	338	412	1155	35.1	8974	7.8
Autónoma ^a	53	91	152	297	17.9	3785	12.8
Autónoma ^b	-	-	-	-	-	24	-
Internacional ^a	2	7	8	17	12.0	187	11.2
Internacional ^c	-	-	-	-	-	-	-
Internacional ^d	4	8	18	30	12.0	539	17.8
Lusíada ^a	50	96	104	249	20.0	4935	19.8
Lusíada ^e	49	72	68	190	25.8	4639	24.4
Lusíada ^f	24	29	14	66	35.7	1115	16.8
Portugalense ^e	28	45	32	104	26.8	2382	22.8
Independente ^a	31	31	66	128	24.3	3046	23.8
Atlântica ^a	5	7	7	19	27.1	222	11.4
F. Pessoa ^e	119	73	57	249	47.7	2827	11.4
F. Pessoa ^g	10	11	10	31	31.2	262	8.4
Lusófona ^a	148	182	241	571	26.0	9412	16,5
Moderna ^a	21	26	26	73	29.1	989	13.6
Moderna ^e	9	30	18	57	15.9	937	16.4
Total	957	1045	1234	3236	26.5	44275	13.7

Notes: a – Lisbon; b – Caldas da Rainha; c – Chaves; d – Figueira da Foz; e – Porto; f – Vila Nova de Famalicão; g – Ponte de Lima.

Sources: OCES, 2005; DGES, 2005

2. The installed physical capacity

Tables 3.43 to 3.45 present data collected on all public institutions of higher education in 2006 and suggest that the available capacity is apparently adequate for the existing number of students, at least considering similar quantitative indicators of other EU countries. Even in those cases where the number of users exceeds the total available capacity (e.g. libraries and computer rooms) one has to consider that there may be several daily shifts, allowing for an increased number of users in good conditions.

Table 3.43 – Installed physical capacity of public institutions, total spaces (education and social support)

	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Administrative areas	7 587	243 899	34 906	33 854
Pedagogic areas	8 817	644 255	78 915	78 417
Pedagogic/scientific support areas	15 870	433 004	56 034	91 852
Social support infrastructures	3 258	508 331	69 221	79 704
Other Infrastructures	2 353	135 971	12 227	53 311
TOTAL	37 885	1 965 460	251 303	337 138

Source: DGES, 2006

Table 3.44 – Installed physical capacity of public institutions, student support systems

	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Central administration				
Administration	50	2 151	135	126
Offices	1	15		
Public attendance (a)	81	1 714	3 268	972
Technical personnel (b)	190	4 249	276	285
Others	86	2 045	292	398
Subtotal	408	10 174	3 972	1 782
Social support infrastructures				
Canteens	152	87 053	32 592	38 387
Bars/Restaurants	190	20 520	13 372	30 308
Halls of residence	2 686	223 475	14 282	nd
Sports (Including university stadiums)	149	171 426	7 467	9 140
Socio-cultural services	14	2 653	647	1 175
Health services	43	1 949	494	453
Others	24	1 254	367	107
Subtotal	3 258	508 331	69 221	79 704
Total SAS	3 666	518 505	73 193	81 486

Source: DGES, 2006

Table 3.45 – Installed physical capacity of public institutions, education and research

Central administration	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Administration (Rector/President/Boards)	175	4 180	172	163
Meeting rooms	83	3 511	1 383	673
Secretariat	88	2 106	182	161
Accounts	83	2 226	210	213
Offices	464	7 763	772	690
Computer rooms	102	2 863	159	159
Personnel management	55	1 676	159	130
Acquisitions	37	1 036	46	46
Others	719	35 870	8 844	9 820
Subtotal	1 806	61 231	11 927	12 055
Schools – Administration	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Administration (Boards)	705	15 527	1 004	925
Meeting rooms	311	12 397	5 051	4 390
Secretariat	554	20 001	1 511	2 348
Accounts	262	8 085	706	646
Offices	1 542	26 915	2 129	2 300
Computer rooms	339	10 161	829	855
Others	1 660	79 409	7 777	8 553
Subtotal	5 373	172 494	19 007	20 017
Schools – Pedagogical spaces	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Classrooms	3 755	216 372	11 792	9 088
Conference rooms	659	86 035	20 465	18 883
Laboratories	2 802	179 724	35 572	37 088
Laboratory annexes and Workshops	976	29 487	2 230	5 829
Others	625	132 637	8 856	7 528
Subtotal	8 817	644 255	78 915	78 417
Schools – Support spaces	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Academic staff – Offices	10 022	162 782	15 465	15 425
Academic staff – Meeting rooms	421	14 614	4 959	4 383
Research laboratories	2 061	95 618	3 171	2 311
Libraries	2 014	96 449	15 161	30 479
Photocopies	214	7 040	742	4 593
Computer rooms	645	35 473	10 230	21 857
Study rooms	493	21 029	6 306	12 805
Subtotal	15 870	433 004	56 034	91 852
Schools – Other spaces	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Students Unions	434	25 340	1 891	14 646
Employment support centres	41	851	38	10 230
Others	1 878	109 780	10 298	28 435
Subtotal	2 353	135 971	12 227	53 311
TOTAL	34 219	1 446 955	178 110	255 652

Source: DGES, 2006

Table 3.45 provides a global quantitative picture, but does not convey any information about the quality or adequacy of the facilities. It should be noted that various international review committees that have evaluated R&D units since 1996 identified a wide variety of situations concerning the availability and general quality of spaces to the practice of R&D activities. Main issues raised were about the morphology of the built environment, namely the implementation of dual-purpose spaces integrating teaching and research, in a way to foster the continuous interaction through proximity (and eventual share) of teaching (i.e.: study rooms) and research (i.e. laboratories and researchers offices) areas. This type of spatial organisation fosters a constant interaction between professors, researchers and students, allowing students to gain from R&D activities carried out in higher education institutions, as demonstrated through many international practices (University of Melbourne 2002), as well as systematically referred by specialised associations (Project Kaleidoscope 2004, SCUP 2005) and in the literature (O'Hare 1998). All of these practices are based on the creation of conditions able to promote students' learning experiences through the nurturing of synergies between research and teaching.

3. New publics and the adequacy to the labour market

Table 3.46 presents data on new entrants into the labour market over the period from 1992 to 2002. Despite a consistent increase of the percentage of new employees with a higher education degree (from 2.1% in 1992, to 10.7% in 2002) the data shows that over that period only 5.7% of the almost 2 million new employees had a higher education degree.

Table 3.46 – Qualifications of the new entrants into the labour market

Year	HE graduates		Non HE graduates/unknown		Total
	Number	%	Number	%	Number
1992	6 117	2.1	291 865	97.9	297 982
1993	5 292	2.5	202 661	95.5	207 953
1994	6 708	3.3	198 755	96.7	205 463
1995	6 470	4.2	148 384	95.8	154 854
1996	7 070	4.8	140 772	95.2	147 842
1997	9 048	5.8	146 903	94.2	155 951
1998	11 004	7.0	146 919	93.0	157 923
1999	12 583	7.8	148 592	92.2	161 175
2000	14 614	9.4	141 546	90.6	156 160
2002	29 931	10.7	249 045	89.3	278 976
Total	108 837	5.7	1 815 442	94.3	1 924 279

Note: Year 2002 accumulates data from 2001.

Source: SILATEE (2002) as cited in CIRIUS final report, (Escária 2004).

Table 3.47 presents sample data about the areas of graduation of the new entrants to the labour market for the period 1994-97 and shows a decline in the percentage of graduates in economics and management and an increase in graduates from social sciences, while the percentage of engineering graduates remained almost stable. It should be noted that a recent report (Alves, 2005) on the employment of the graduates from the University of Lisbon (1999-2003) shows some additional interesting conclusions. Graduates in Medicine, Physics, Computer Sciences and Pharmacy (representing 45.7% of all the University's graduates) have become, in general, employed once they obtained their degrees; graduates in Geography, Mathematics, Fine Arts, Design, Education, Psychology and Dental Medicine (30% of all graduates) were generally employed shortly after completing their degrees, while graduates in Philosophy, Geology,

History and some graduates in Psychology (13.9% of all graduates) waited at least 12 months before finding employment.

Table 3.47 – Graduation areas of the new entrants into the labour market

Area	1994		1995		1996		1997	
	n	%	n	%	n	%	n	%
Economics/management	1 632	22.2	2 000	28.5	1 984	25.5	2 527	25.7
Engineering	1 370	18.7	1 225	17.4	1 457	18.7	1 687	17.1
Arts	253	3.4	222	3.2	261	3.4	357	3.6
Sciences	469	6.4	393	5.6	509	6.5	583	5.9
Education	560	7.6	546	7.8	489	6.3	551	5.6
Health Sciences	345	4.7	299	4.3	289	3.7	342	3.5
Social sciences	581	7.9	485	6.9	546	7.0	605	6.1
Int. relations/communication	229	3.1	290	4.1	351	4.5	606	6.2
Agriculture, Agro Industries	275	3.7	208	3.0	213	2.7	227	2.3
Others	1 628	22.2	1 360	19.4	1 685	21.6	2 362	24.0
Total	7 342	100.0	7 028	100.0	7 784	100.0	9 847	100.0
Area	1998		1999		2000		2002	
	n	%	n	%	n	%	n	%
Economics/management	3 161	26.8	2 997	22.6	3 006	21.4	5 610	19.8
Engineering	1 822	15.5	1 609	12.1	2 571	18.3	4 877	17.2
Arts	384	3.3	344	2.6	754	5.4	1 772	6.2
Sciences	574	4.9	525	4.0	501	3.6	1 506	5.3
Education	584	5.0	459	3.5	531	3.8	1 298	4.6
Health Sciences	398	3.4	327	2.5	504	3.6	1 189	4.2
Social sciences	795	6.7	756	5.7	2 157	15.3	4 536	16.0
Int. relations/communication	728	6.2	675	5.1	317	2.3	663	2.3
Agriculture, Agro Industries	265	2.2	192	1.4	173	1.2	294	1.0
Others	3 072	26.1	5 381	40.6	3 565	25.3	6 627	23.4
Total	11 783	100.0	13 265	100.0	14 079	100.0	28 372	100.0

Source: SILATEE (2002) as cited in CIRIUS final report (Escária 2004)

Despite the relative massification of higher education in recent decades, the rates of return of higher education degrees in Portugal have been persistently high, at the highest level for the 15 EU countries (Pereira and Martins, 2000). For example, Table 3.48 shows that 81.2% of the relative earnings of new employees with a higher education degree lie in the highest quintile, which compares against only 16.1% for non-graduates.

Table 3.48 – Relative earnings to the new entrants' average earnings

	HE graduates		Non graduates/unknown		Total	
	Number	%	Number	%	Number	%
Quintile 1	1 120	1.3	265 959	18.9	267 079	17.9
Quintile 2	1 513	1.7	331 972	23.6	333 485	22.3
Quintile 3	3 105	3.5	295 960	21.1	299 065	20.0
Quintile 4	10 947	12.3	284 440	20.3	295 387	19.8
Quintile 5	72 190	81.2	225 456	16.1	297 646	19.9
Total	88 875	100.0	1 403 787	100.0	1 492 662	100.0

Source: SILATEE (2002) as cited in CIRIUS final report, 2004

However, Table 3.49 shows that until 2000 there has been an apparent convergence of the relative earnings of graduates and non-graduates, a trend that seems to have been reversed in 2001/02.

Table 3.49 – Evolution of the relative earnings to the new entrants' average earnings

	HE graduates	Non graduates/unknown	Total
	Average	Average	Average
1992	2.74	0.96	1.00
1993	2.62	0.96	1.00
1994	2.47	0.95	1.00
1995	2.15	0.94	1.00
1996	2.04	0.94	1.00
1997	1.93	0.93	1.00
1998	1.93	0.86	0.94
1999	1.89	0.91	1.00
2000	1.77	0.90	1.00
2002	2.03	0.89	1.00
TOTAL	2.03	0.93	1.00

Source: SILATEE (2002) as cited in CIRIUS final report, 2004

Table 3.50 presents the evolution of the relative earnings of new labour market entrants with a higher education degree, by area of graduation and shows that engineering graduates have the highest earnings followed by the health professions. However, in the latter case it is necessary to take into account that most graduates have degrees in nursing and health technologies, not in medicine. It is also interesting to notice the decreasing trend in the earnings of graduates in economics/management.

Table 3.50 – Evolution of the relative earnings to the new entrants' average earnings,
by area of graduation

	1994	1995	1996	1997	1998	1999	2000	2002	Total
Economics/management	2.56	2.31	2.20	2.05	1.92	2.00	1.83	1.75	1.99
Engineering	2.71	2.44	2.31	2.30	2.20	2.34	2.27	2.07	2.27
Arts	1.83	1.77	1.81	1.87	1.57	1.72	1.85	1.80	1.78
Sciences	2.13	1.93	1.81	1.75	1.81	1.78	1.96	1.96	1.90
Education	2.23	2.09	1.94	1.90	1.87	1.85	1.66	1.57	1.84
Health Sciences	2.28	2.35	2.40	2.32	2.17	2.17	2.10	1.93	2.13
Social sciences	2.13	2.04	1.89	1.88	1.85	1.74	1.83	1.72	1.81
Int. relations/communication	2.07	1.98	1.77	1.78	2.04	1.68	1.85	1.51	1.80
Agriculture, Agro Industries	1.97	1.91	1.80	1.81	1.77	1.76	1.65	1.61	1.78
Others	2.37	2.25	2.07	1.92	1.69	1.81	1.73	1.64	1.83
Total	2.40	2.23	2.10	2.01	1.90	1.92	1.90	1.78	1.95

Source: SILATEE (2002) as cited in CIRIUS final report, 2004

Beyond the aspects raised in terms of overall employment, it should be noted that brain drain has not been considered a problem for Portugal so far, but current international trends on competition for skilled people are representing new challenges for Portuguese policies. Portuguese universities increased the offer of PhD programmes, which in turn created new challenges for the mechanisms that guarantee their quality, and the need to strengthen their internationalisation and to establish international scientific research networks. Employing Portuguese PhD holders raised a series of new issues associated to emerging challenges and opportunities in terms of scientific employment, which can be analysed on the basis of three surveys carried out between 1999 and 2001 among former FCT scholarship holders since 1990. They clearly show that most of these former scholarship holders carry out their professional activity in Portugal, mainly in higher education institutions (Figure 3.24). It is, in fact, the capability to train and attract new PhD holders, fostering scientific employment that determines the full maturity of a scientific system, and it is also decisive to improve the scientific activity in networks to promote institutional relationships, either between university units, or between these units, State Laboratories and companies. The enhancement of these scientific-based networks, in addition to softening the effects related to the small size of research units, shall certainly encourage knowledge creation and diffusion, and scientific development in a context of constant change and growing scientific based internationalisation.

Figure 3.24 – Results of the surveys made to former FCT's scholarship holders that develop their professional activity in Portugal or abroad

Source: FCT 1997-2001 – 5 years Report, Portuguese Science and Technology Foundation; Primary data from OCES, Survey on the professional situation of former PhD scholarship holders.

It should be noted that the improvement of the S&T system over the last few years has been associated with a critical challenge related to the need to restructure the university faculty career system. This includes devising forms of merit recognition devoted to young researchers, regardless of the existence of vacancies in the university faculty staff exclusively derived from the number of enrolled students. Indeed, the progressive saturation of these vacancies, at least in older universities, has stalled the attractiveness of scientific careers, which requires the change of university recruiting systems to schemes such as those in force in more developed S&T systems.

It is also worthwhile mentioning that, since 1998, there has been a visible absorption of PhD holders by the private higher education and by the polytechnic higher education systems. This fact corresponds to a new situation that Portugal is facing (FCT 2002), which needs to be duly analysed and dealt with, in particular by revising the faculty career statute in polytechnic institutes. These aspects obviously need a more detailed discussion about the institutional context in force, in particular the University Faculty Career (ECDU).

The information on the employability of Portuguese PhD holders since 1998 shows the importance new areas or fields of employment besides higher education sector have appeared. There has simultaneously been a slight growth in the number of former scholarship holders working abroad, namely in universities or in research centres. Thus, it should be clear that the national and international mobility of new PhD holders, mainly within the European area and in a context of effective need to promote the internationalisation of research units, is particularly pertinent in the current development stage of the national S&T system. However, it should also be clear that the different surveys reflect a possible brain drain trend in Portugal, with the increasing permanence of Portuguese scientists abroad, unless measures for the promotion of scientific employment are taken without much delay.

4. Internationalisation as an opportunity for increasing enrolments

The rationale for the internationalisation is based on the perception that “it is not possible to vindicate the quality of the education system isolated from the international, and in particular the European, context”. For Portugal, this is further rooted in the cultural rationale of language and in the co-operation

with Portuguese Speaking Countries. This has contributed to the relative internationalisation of the Portuguese higher education in countries where Portuguese is the official language (Angola, Mozambique, Cabo Verde, Guiné Bissau, S. Tomé e Príncipe – the African Countries with Portuguese as Official Language, PALOPs – East Timor and Brazil. In particular, there are special regimes for access to higher education for students from the ex-colonies, both in public and private higher education institutions (universities and polytechnics).

There are also foreign students enrolled as normal students within Portuguese higher education institutions and Figure 3.25 presents the number of these students by Continent of origin. Half of the students come from Africa (PALOPs). Among the European students the main percentage was from Luxembourg. More recently this scenario has changed, and citizens from Switzerland, France, Belgium and United Kingdom became the main European students in Portuguese higher education (OECD 2005).

Figure 3.25 – Foreign students enrolled in Portuguese institutions as regular students

Sources: OCES, 2005

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PART IV - MAIN ISSUES AND CHALLENGES

The analysis presented in this report presents indicators that disclose the dual characteristics of Portuguese society and its commitment to the knowledge economy, given the impressive growth over the last decades. Indeed, the current emerging discussion on the role of higher education for a knowledge-based society should be understood in the context of the social and economic change in Portugal within the European Union, especially in terms of the need to evolve to a knowledge-driven economy.

It is important to note that the current policy challenges correspond to a period of relative stagnation in the growth of higher education students, after a period of more than 30 years of consecutive growth. Over the last decades Portugal was able to increase its higher education system at a growth rate that has no parallel in other European countries. Today the gross participation rate (18-22 years) is over 50% and the number of students increased almost 800% relative to the 1974 student population. Research activities also increased substantially over the last decade: the number of PhDs in Portuguese Research Units increased over 130% from 1996 to 2003, the yearly number of new PhDs increased more than three-fold from 1990 to 2004, while the yearly number of Portuguese scientific publications increased fourfold between 1991 and 2001.

This process is associated with the development of a complex network of institutions, integrating 14 public universities and one university institute and 15 public polytechnics, together with a network of about 117 private institutions. These include the Catholic University with *campi* in several towns, 14 universities, 3 polytechnics, other 27 diverse institutions teaching university level programmes, and around 70 other institutions teaching polytechnic programmes. In this context, a number of challenges and issues need to be addressed, including:

- How to improve the regulatory framework and to adequate the supply of tertiary education to the labour market, fostering quality with the necessary specialisation? How far does the country require strengthening lifelong learning, vocational training, and certification of formal or informal training, as well as more flexible study schemes?
- Which level of public funding is appropriate to guarantee the adequate growth of the knowledge base? What are the implications for the organisation of the supply of higher education and, in particular, for post-graduation education?
- Which governance system and level of autonomy for higher education institutions?
- How to enlarge the number of students, decrease dropout and retention rates and help qualifying the Portuguese population? Which student social support and loan systems?
- Which strategies to promote access for new publics, including students who have left the education system before enrolling in higher education, including those from working class and lower class backgrounds?

- How to promote the internationalisation of higher education and research units? Reflecting upon a possible brain drain trend in Portugal, which career prospects should be offered for research and academic staffs?

Clear policy options are essential for guaranteeing the qualification of the Portuguese people in the European space, implementing the Bologna process and reinforcing the system of higher education, promoting the quality of the system and extending access to new publics. Contrary to what is sometimes affirmed, Portugal does not have too many graduates, but actually has too few. Holding a qualification from higher education is a social resource that is critical for future learning, life plans and employability. Making higher education training more socially and culturally relevant and improving its quality will simultaneously attract more people to attend courses and assure better conditions for their successful completion.

In fact, Portugal is one of the European countries with the lowest number of graduates and increasing the academic and professional qualifications of the Portuguese society continues to be an essential factor for its economic, social and technological modernisation.

But the analysis of higher education should be framed conceptually within a systemic view of the role of science and technology, in which the main issue relate to knowledge sharing and diffusion. Therefore, the analysis should focus on the understanding of a complex national context, considering the following factors:

- People: it refers to the country's human capital, in particular, to the levels of formal education held by its workforce. The country is still characterised by a workforce with rather low educational and training levels, contrasting with a younger population with qualification levels similar to other OECD countries. This fact has resulted in new challenges for the workforce qualification development, and for the attraction of new talents to S&T in order to foster scientific employment and to expand national and international knowledge networks.
- Knowledge: it is linked to the creation of new knowledge in Portugal, because the country has serious deficits in R&D scale and intensity in comparison with the other OECD countries.
- Ideas: in particular, knowledge diffusion and innovation capacity, to which the relationship of firms with academic research brings about new challenges and also an increasing accountability of its activities.

Moreover, other aspects should be noteworthy within a conceptual framework, such as:

- Infrastructures: consists on the necessary conditions for the development of tertiary education, namely for the functioning of scientific institutions and their relationship with higher education, society, and firms in particular.
- Institutions: consists on the sufficient conditions for a knowledge driven society, including the necessary reinforcement of the scientific institutions, as well as the legal framework under which higher education develops.
- Incentives: consists on the necessary conditions for a higher education system, especially in terms of public and private efforts that are vital to develop new and disseminate existing knowledge. In this context, market conditions, competitive structures and naturally public policies are considered, especially associated with higher education funding and evaluation.

Knowledge-based economies and their performance in competitive knowledge environments depends basically on the quality of human resources (namely, their specialisation, competences, educational level, and learning capacity) and on the activities and incentives, which are oriented towards knowledge creation and diffusion, an area where Portugal shows a clear deficit.

Several studies over the last decades have shown that the complexity of the innovation process favours societies organised around a demanding culture with evaluation routines and open to criticism. This requires structures that are prearranged formally and institutionally (i.e., schools, firms, universities, laboratories, governmental and non-governmental organisations, namely for the promotion of scientific culture). For that reason, it is vital for States to make the autonomy of universities and scientific institutions feasible, and to enable a sustainable development of science, possible regardless of external alterations. This is a major objective of the current government programme, and it represents a major challenge for the institutions themselves, as well as for the governance of the higher education system.

In order to allow scientific organisations and higher education institutions to develop and promote themselves autonomously, the diversification of funding sources should be facilitated and the governance of the system renewed. The institutions themselves must defend their own budgets, namely in face of independent peers. It is obvious that this process involves institutional reform, deriving from the higher education institutions' need to evolve towards responsibility and accountability to society.

Within the higher education system, the strengthening of science and technology institutions necessarily involves the sustainability of incentive programmes and the continuous implementation of independent scientific evaluation models, which have been put in practice and disseminated in the most industrialised OECD countries. Portuguese institutions have experienced these processes in a systematic way only since 1996, and such practices should be continued and fully appropriated in Portugal.

In this context, Table 4.1 presents the main Governmental goals, as expressed through the revised country strategy to achieve the Lisbon Goals, as well as the Government's Technological Plan. The main objective for higher education during the present legislature is to contribute towards overcoming the country's scientific and technological backwardness and to fulfil the urgent need to guarantee that new generations are qualified for the requirements of the European space, guaranteeing the full integration and qualification of national institutions of tertiary education in Europe.

The international qualification of the Portuguese tertiary education is essential for the development of the country and the employability of its graduates. This challenge involves assuring the transition from an education system based on the transmission of knowledge to a system based on competence building. This is a central and critical issue all over Europe, and particularly in Portugal, where there are high dropout and failure rates and the conservative influence of rhetorical and passive methods of teaching.

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Table 4.1 Main Government Goals for 2010, as expressed through the Government's "Technological Plan"

Context	Indicator	Source	EU 15	EU Leader	Spain	Portugal	
			2003			2003	Goal 2010
Characterization of Human Resources	1. Tertiary graduates in science and technology per 1 000 of population aged 20-29 years	Eurostat	12,2 (2001)	24,2 (IE)	12,6	8,2	12
	2. S&E graduates (ISCED 5 e 6) as % of new degrees	Eurostat, Key Figures 2005	24,2%	30,5% (SE)	28,1%	19%	25%
S&T Resources (input)	3. Total R&D personnel (FTE) per thousand labour force	OCDE, MSTI	10,5%	21,8 (FI)	7,8%	4,7%	7,5
	4. Number of researchers (FTE) per 1000 labour force	Eurostat, Key Figures 2005	5,4 (EU25)	16,2 (FI)	4,9	3,6	6
	5. Highly qualified scientific and technical workers as % of total labour force	Eurostat, Key Figures 2005	13,8% (EU25)	21,2% (DK)	15,3%	7,8%	11%
	6. Business Enterprise Expenditure on R&D (BERD) as % of GDP	Eurostat, Key Figures 2005	1,23% (EU25)	2,95% (SE)	0,57%	0,26%	0,75%
	7. Percentage of Gross domestic expenditure on R&D (GERD) financed by government	Eurostat	0,70%	1,0% (SE)	0,42%	0,47%	1%
S&T Performance (output)	8. New PhDs per thousand population aged 25-34	OCES, INE	-	-	-	0,60 (2003)	0,9
	9. New PhDs in S&E fields of study per thousand population aged 25-34	Eurostat, Key Figures 2003-4	0,55 (2001)	1,37 (SE) (2001)	0,35 (2001)	0,30 (2001)	0,45
	10. Number of scientific publications per million population	Thompson Scientific, Key Figures 2005	439	1642 (SE)	588	406	650
	11. Number of patent applications to the European Patent Office (EPO) per million inhabitants	Eurostat	158,72 (2000)	361,50 (SE) (2000)	28,75 (2001)	4,01 (2000)	12
	12. Number of patents granted by the United States Patent and Trademark Office (USPTO) per million inhabitants	Eurostat	66,66 (2000)	494,16 (LI) (2002)	8 (2002)	1,29 (2002)	4
	13. High-tech manufacturing industries - exports as % of total manufacturing exports	Eurostat (comext), UN (comtrade), Key Figures 2005	19,7% (EU25)	51,6% (IE)	9,3%	11,6%	15%
	14. Technology balance of payments (receipts-payments) as % of GDP	OCDE	- 0,06% (2001)	0,51% (BE+LU) (2001)	- 0,14% (2001)	- 0,28% (2001)	- 0,15%

But the challenges for Portugal also include improving access to tertiary education and creating the conditions for enabling every citizen to gain access to lifelong learning, and developing the role of the institutions of higher education in this process. In this context, the main objectives of the Government for the 2005-2009 period include:

- Implementing the Bologna European process for the reform of tertiary education, which is an opportunity to stimulate entry into higher education, to improve the quality and relevance of the training provided, and to encourage mobility and internationalisation.
- Reinforcing the system of tertiary education with autonomous institutions, facilitating the reform of their governance mechanisms in order to develop a culture of accountability and to make forms of organisation and management more flexible, promoting the de-governmentalisation of the system and valuing partnerships between national and foreign institutions.
- Promoting the quality of the system, valuing the need to work with various types of public, which would require the structuring of an internationally recognised quality assurance system, developing the present model of assessment and financing and developing a national system of accreditation.

- Promoting equal opportunities for access to tertiary education, improving attendance and completion of courses in higher education, attracting new types of public in a logic of lifelong learning and the improvement of student social support.

For these objectives to be achieved, it will be necessary to:

- Give priority to the consolidation and re-organisation of the system of tertiary education, avoiding further expansion of infrastructures without a serious critical review of the installed capacity;
- Promote the independent, transparent and rigorous assessment of the public and private, university and polytechnic systems, working with international standards (namely as set by OECD), to permit the necessary stream-lining and re-organisation of the present system in the light of the challenges in the future;
- Stimulate the diversity and flexibility of the higher education system, particularly in terms of specialisation and institutional performance and guaranteeing closer relationship between the university and polytechnic sub-systems, valuing excellence in both;
- Create and develop a system of accreditation for all of tertiary education according to international standards, which together with the progressive internationalization of the present system of assessment, may contribute to internationalizing the education system and improving the regulation of the system to benefit public interest, clarifying the role of the State in relation to the institutions;
- Clarify the public funding system of the institutions of higher education, guaranteeing the necessary stability in the institutions and building trust between the institutions and the State;
- Review both the laws regulating the autonomy of the universities and polytechnics and those regulating academic careers, in order to adapt the objectives of higher education to the European space.

Main activities taken by the Ministry of Science, Technology and Higher Education in 2006

The Government has taken measures aimed at the reorganisation of course offering in higher education. This includes the rationalisation of course offerings so as to provide better educational opportunities of higher quality for the highest number of people and to make more efficient use of resources. As part of this process:

- Courses with less than 20 students are no longer financed, except in exceptional cases.
- A policy of concentrating training at the 1st level is being developed, thus seeking to reduce dispersal of available courses.

The Government passed the regulatory framework for the reorganisation of the higher education system adopting the three stages (Bologna Process) of levels and diplomas. The Basic Law of the Education System by Law No. 49/2005, of 30 August, Decree Law No. 74/2006, of 24 March was approved, which regulated the three-level system, and set the conditions for course accreditation during the transitional model until the accreditation agency is set up and functional.

Higher education institutions have been reorganising their courses and programmes. In 2006-2007 about half of the first level courses have been reorganised in accordance with the Bologna model. In 2007-2008 the remaining courses are expected to have been organised. The process of adjustment is due to be completed in 2008-2009 so that, in 2010, the new organisational model will be fully applied to all educational stages.

The Government set a target to create a national quality assurance system for higher education, which is internationally recognised and based on four principles:

- The expansion of the assessment of institutions' performance
- Setting up evaluation criteria and translating the results into qualitative assessments, establishing comparable and clear consequences of the assessment.
- The internationalisation of the assessment process, namely in terms of institutional assessment
- Setting up certified quality assurance systems for universities and polytechnics.

A first revision of the financing system for public higher education institutions was carried out. It established:

- A distributional basis for the amounts earmarked in the State Budget based on cost factors by educational area.
- The financing of the 2nd level of higher education was assured.
- The expansion of training to new audiences, in terms of admitting adults to the system through a special process of admission and in terms of post-secondary level 4 training (technological specialisation courses).

According to the constitutional rules and the Government Program, tuition fees for the 2nd level of higher education studies (masters) were set, differentiating between those that are indispensable for professional activity, where the fee is identical to that for the 1st level, from the remainder the tuition fee is set freely by the higher education institutions. The same applies to third level of studies.

The Government decided that public national and community investments in new higher education buildings will be carried out by tender. This will permit the assessment of priority to each project and establish a framework of national priorities for higher education.

With the objective of promoting educational success and combating failure and drop-outs, a public tender was launched for higher education institutions. Two lines of projects were promoted and the assessment of applications is currently underway.

- Diagnostic projects that contribute to the analysis and understanding of situations of educational failure in higher education, as well as ways of eradicating structural or other causes that lead to educational failure and student drop-out.
- Intervention projects that develop corrective measures of a social and organisational nature to promote educational success, combat failure and dropping out of higher education.

Within the framework of promoting international partnerships to internationalise Portuguese higher education, contracts and protocols have been signed by universities and R&D centres with:

- The Massachusetts Institute of Technology, in the areas of engineering (Concept and Advanced Industrial Production Engineering, Power Systems, Transport Systems and Bio-engineering Systems) and management (including the setting up of an international MBA programme and a programme of PhD seminars).
- Carnegie Mellon University, with the aim of carrying out advanced training programs, granting joint degrees at the masters level (Software Engineering, Information Networks and Information Technology Security) and the doctorate level (Computer Engineering and Electro technical, Computer Sciences, Computer Processing of Speech, Information and Technology Management and Mathematics).
- In 2006 negotiations with the University of Texas at Austin will be concluded, with the aim of developing collaboration in the areas of Digital Media and Commercialisation of Technology.

Decree Law No. 88/2006, of 23 May was approved and reorganizes level IV training¹⁵ (technological specialization courses), namely the reorganization of their structure, focusing on the technological training component and altering conditions of admission in order to permit new audiences. This training will be provided mainly by higher education polytechnic schools (and may also be provided by universities), which will be financed for that purpose within the framework of their general financing. In 2006-2007 about 100 new courses are expected to be functional, half of them in technology fields.

Decree Law No. 64/2006, of 21 March created special entrance exams to evaluate the capacity of those aged over 23 to attend higher education. This new admission model values academic qualifications via exams results set by the higher education institutions as well as professional experience assessed by a curricular evaluation. The application of this new model of admission and entrance into higher education for new audiences began in 2006, and has led to significant new demand. Provisional figures show that around 7,500 applications were made for examinations in the public sector and 5,500 in the private sector.

Alongside the increase in budget for social support measures were taken to reduce the running costs of services and to increase the proportion of expenditure to support disadvantaged students.

The State Budget Law for 2006 authorised the Government to set up a system of guarantees of loans for higher education students (article 101 of Law No. 60-A/2005 of 30 December). The Government is currently in contact with financial institutions in order to study a model of financing student to attend higher education.

The government program of administrative and legislative simplification known as SIMPLEX 2006 has promoted a number of measures that help streamline administrative procedures in higher education:

- Following the adoption of Bologna's process the Government decreed the approval of the plan of studies in higher education to rectors and polytechnics presidents.
- Facilitating specific budget alterations and their approval process concerning Public Institutions of Higher Education and Science and Technology.

¹⁵ Decision No. 85/368/EEC, of the Council, of 16th July, published in the Official European Community Journal, No. L 199, of 31st July, 1985

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- Facilitating ministerial ability to transfer and delegate responsibilities concerning Higher Education institutions to University Rectors and Presidents of the Polytechnics.
 - Simplification of transference and change of studies procedures into one regime allowing greater mobility to students from national and foreign institutions thereby making the procedures less complex.
 - Simplification of the procedures of attribution of social grants to students of higher education through the reduction of necessary documents and implementing a uniform application process.
 - Simplifying the process of contracting foreign faculty and researchers, eliminating bureaucratic measures which made access to highly qualified teaching staff from foreign countries difficult.
 - Application of the European system of transference and concentration of credits (ECTS) in a new regime granting recognition to continue studies in higher education.
 - Introduction of a process of recognition of academic and professional experience for higher education degrees.
 - Introduction of on-line application to public higher education institutions.
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