CENTRO DE ESTUDOS PARA A INTERVENÇÃO SOCIAL

MOBISC

Science careers in Portugal

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Contents

Introduction

This paper is part of a broader study – *MOBISC-Equal pay, career progression and the socio-legal valuation of care* – which aims at examining the impact of care and unpaid work on the career progression of men and women in employment sectors demanding a high level of international mobility, focusing on science careers and on two areas - medical and life-sciences and physical sciences.

It provides contextual information for Portugal detailing the pathways to get into and progress in a research career in the field of science.

Particular attention is given in the paper to specific requirements, such as the requirement for mobility, which may act as constraints for a balanced gender representation and progression in the different levels of scientific careers.

1. Overview

Portugal has experienced for the last 30 years (the Revolution of the 25th April 1974 representing at this level - as well as at many others – a major benchmark) a trend in favour of the **democratisation** of the educational system and, in particular, to a significant increase in the access to higher education.

The **growth in the number of students in tertiary education** has been among the highest in the European Union (EU): 3.4 times between 1975 and 1994 (see EUROSTAT, *S&T statistics, UOE questionnaire*, in Perista and Baptista, 1999) and 1.4 times in the second half of the nineties, i.e. 1994-2000 (see EUROSTAT, *S&T statistics, UOE questionnaire*, in *Política de formação avançada e qualificação de recursos humanos da FCT*).

This process has been also marked by a consistent growth in the **participation of women** in the upper levels of education, which contributed to a rather new ‘panorama’ in terms of academic qualification and job opportunities, namely in science, for women and men.

However, nowadays Portugal is still facing a **serious problem in terms of human resources** (which is even compromising the achievement of the goals defined in this domain by the Lisbon European Summit). Early drop-out from school, even before the accomplishment of compulsory education, is a common feature and the proportion of the total population with some level of higher education is rather low, 10.8% - 9.9% of men and 11.7% of women (see INE, *2001 Population Census*). Taking the EUROSTAT – *Labour Force Survey* indicator of the supply of advanced skills[1], we reach the same conclusion: the figure for Portugal does not exceed 9.4%, compared to 21.5% for the EU15 average[2] (see DG Enterprise, 2003).

Therefore, the promotion of human resources qualification has been presented as a major political goal, aiming at a growing convergence with the average situation in the EU, in particular regarding post-graduate training. Priority has thus been given to the stimulus to PhD and post-doctorate studies as a means to **increase academic qualification** as well as to enlarge the research field, given that the number of researchers per thousand active population is still one of the lowest in the EU – 3.27, which represents 62% of the EU average (even if showing a growth rate between 1995-1999 of 7.61%, compared to 2.89% for the EU average) (see DG Research, *Figures 2001 – Benchmarking national research policies*, in *Política de formação avançada e qualificação de recursos humanos da FCT*).

Internationalisation of advanced training is a parallel goal to the improvement of the qualification and the number of researchers. This has traditionally applied to the granting of support to the prosecution of doctoral and post-doctoral studies abroad (especially in the EU) but, in the last couple of years, it has also meant a growing presence of foreign post-graduate students, among grant holders in Portugal.

A third major political goal, in the science field, has been to **increase R&D activities in the industry sector**. R&D activities are largely under-developed in the business enterprise sector and recent policy measures aiming, for example, at the recruitment of Master's and PhD holders by companies have been rather unsuccessful. A science

[1] Number of persons with some form of post-secondary education in percentage of the reference population aged between 25 and 64 years inclusive.
[2] Although, given the national variations in this domain, and as stated in the reference document, we are well aware of the difficulties in making international comparisons regarding educational levels.

career in the industry sector, for men and especially for women researchers, is thus not a common situation in Portugal.

2. Post-compulsory schooling: secondary education

Education is **compulsory** until the age of 15 years and the attainment of 9 years of schooling. At the end of compulsory education young people can enter **secondary education**. Secondary education is organised in general courses, predominantly oriented to the entry to higher education, and in technological and vocational courses, predominantly oriented to the entry to the labour market – however, the permeability among the different courses is ensured.

284,296 students are enrolled in the regular secondary education in 2002/2003 (plus 70,882 enrolled in the *recorrente* (recurrent) secondary education[3]. The majority of the students in secondary education (general and technological courses) in 2002/2003 are enrolled in natural science courses (see *Alunos matriculados. Pessoal docente em exercício*).

Girls represent 51.9% of those studying natural science at secondary courses (see *Estatísticas da Educação 1999/2000*, in CIDM, 2004). In 1992/1993, there was a different grouping of the courses in secondary education; this showed a marked difference in the female enrolment rate (in the 10th and 11th years) in natural science courses – 56.8% - and in scientific-technological courses – 12.6% (see CIDM, 1995).

It is also important to notice that the number of enrolments in secondary education decreased in the last years, which may be due to the ageing of Portuguese population.

[3] Enrolment in recurrent secondary education is possible for those who are aged 18 years or over and who have already completed the 9th grade of schooling.

3. The high education system

3.1. Undergraduate study

Individuals who want to **apply for entry** to higher education are submitted to national level examinations (at the end of the 12th grade). They must apply, at a national level also, to the courses and universities of their choice and, according to the average of their marks (calculated on the basis of the examinations marks and the average marks from secondary education) and the number of places available, they may be or not be admitted.

Access to higher education can also be gained through special contests (for which very few places are usually available), addressed to individuals aged over 25 years who have not completed a secondary course, individuals who already hold a medium or higher course, or candidates who have been previously enrolled in higher education institutes in a foreign country. Special regimes are also foreseen, for example, to diplomatic personnel and their accompanying relatives or to Portuguese citizens who are grant holders in a foreign country and their accompanying relatives.

The **average age** for people to start their degrees is 18/19 years old.

Higher education is composed by ***bacharelato*** courses, which are 3 year courses (short-term higher education courses) and by ***licenciatura*** courses, which are 4 to 6 year courses (long-term higher education courses).

363,340 students were **enrolled** in higher education in 2001/2002, of which 55.6% were women. The feminisation rate was 66.4% in life sciences and 54.1% in physical sciences. (See *Observatório da Ciência e do Ensino Superior*, in CIDM, 2004)

The participation of **women in science** in higher education seem to tend to increase, especially in health sciences, since the feminisation rate of the enrolments in selected domains in previous years was as follows:

	1990/91	1994/95	1996/97
Exact and natural sciences	60.6	60.2	60.1
Health sciences	66.6	72.6	71.8

(Source: *Estatísticas da Educação*, in CIDM, several years)

On the other hand, women represented 64.3% of all graduates from higher education in 2001/2002 (see *Observatório da Ciência e do Ensino Superior*, in CIDM, 2004).

This follows a trend for the existence of more female than male graduates from tertiary education in almost every Member States of the EU. Figures for Portugal show that in 1999/2000 women graduates from tertiary education represent 9.4% of the population aged 25-29, compared to 5% for men. However, taking science and technology (S&T) graduates from tertiary education only, the relative participation of women declines significantly: in 1999/2000 the percentage of women graduates in S&T among all graduates was 10.3%, compared to 31.3% for men. Even though, on one hand, this shows a positive evolution relative to 1995/1996: in this academic year, the equivalent figures were 9.9% and 30.1% (and the corresponding absolute numbers were also lower). On the other hand, Portugal is one of the few EU countries in which the number of male graduates in S&T less than doubles the number of female graduates in these disciplines. (See EUROSTAT, 2003)

Nevertheless, this goes along with a disadvantaged position of Portugal, compared to the EU, in terms of the EUROSTAT structural indicator on total **tertiary graduates in science and engineering** per 1000 of population aged 20-29: Portugal is one of the EU countries where this indicator is below 20% of EU15 mean, 6.4 and 11.3, respectively (see EUROSTAT, structural indicator II.4.1, in DG Enterprise, 2003).

The legislation on the basis of the **funding** of higher education (Law nº 37/2003, of the 22nd August) defines that students are supposed to participate in the respective costs, having to pay **tuition fees**. The value of these fees is defined by each higher education institute, in each year, according to the nature of the courses and their quality, with a minimum value corresponding to 1.3 the national minimum wage (i.e. 1.3*€ 356.60, in 2003/2004).

We may give, as an example, the annual value of the fees defined by the Faculty of Sciences of the University of Lisbon for 2003/2004. This value is € 852 for the

licenciatura. However, students whose household has an income *per capita* equal or lower than the national minimum wage and who are not entitled to a studies grant benefit from a partial exemption of the fees, having to pay € 502.

Following this recent legislation, the value of fees has very much increased in many universities, which gave motif to large students' demonstrations and other contestation initiatives against fees all over the country.

Higher education students are, in principle, covered by an **educational social action system**, guaranteed by the State (although this is usually criticised for being clearly insufficient and poorly funded).

Direct social support is provided by **studies grants**. These grants may be given to economically disadvantaged students (whose *per capita* family income is lower than 1.2*national minimum wage) who exhibit merit, dedication and a good school performance. Studies grants may also be given by merit to students with an exceptional school performance. Specific complements to the grant are due to disabled students as well as to students coming from the Autonomous Regions of Azores and Madeira. The average monthly value of the studies grants vary between € 46.30 and € 492.20, depending on the economic situation of the student's household.

Studies grants for secondary and higher education students are also offered by some private institutions such as the Calouste Gulbenkian Foundation. These grants may be given to Portuguese students, in the country, who are economically disadvantaged and who have high academic grades (an average of 16, as minimum, in higher education).

Indirect State social support for higher education students is given through the **provision of services** such as academic canteens and residences, as well as the facilitation of the access to health services, cultural and sports activities and other educational support (photocopies, school material, etc.).

A system of **loans** for higher education systems was introduced a few years ago (by Decree-Law nº 512/99, of the 24th November). This aims at the financial autonomy of the students, namely through the creation of lower interest rates. These loans are particularly addressed to students who are economically disadvantaged and who have

a satisfactory school performance. In a first phase these loans are restricted to students enrolled in the last years of *bacharelato* or *licenciatura*, but it is foreseen that in the future these might be extended to post-graduation students who do not have a job. The value of the loan can go up to 24*national minimum wage for students enrolled in the last but one year or up to 12*national minimum wage for students enrolled in the last year of the course. Disabled students benefit of a more favourable treatment in terms of interest rates and term of the loan (which may reach 10 years, compared to the usual 8 years maximum). EU citizens living in Portugal for at least 2 years and whose household income is taxable in Portugal are entitled to these loans.

Higher education funding may also be based on specific **education saving plans** (introduced by Decree-Law nº 357/99, of the 15th September). These saving plans are meant to cover vocational or higher education costs of the participant or its relatives in Portugal or abroad. They entitle participants to specific fiscal benefits. The annual limits of the reimbursements (which may only occur 5 years after the subscription of the saving plan) by each student vary between € 2500 and € 5000, according to the location of the education institute relative to the usual place of residence of the student.

3.2. Post-graduate study / research

A large part of the student population is still lost in the transition to post-graduate study. However, the labour market value of the *licenciatura* (as well as the unemployment rates among higher education degree holders) has been decreasing in recent years; therefore it has becoming more and more common a direct pathway from *licenciatura* to *mestrado* (**Master's degree**).

The number of students enrolled in Master's degrees (in the academic year 1999/2000) is 8,725, of which 54% are women (see *Estatísticas da Educação 1999/2000*; feminisation rate in CIDM, 2004).

Entry into Master's degree usually depends on the average marks of the *licenciatura* – the minimum required usually being 14. Masters degrees are awarded after the successful completion of a taught course (usually 1 year, it may go up to 2 years) and a

dissertation (1 year) – although the expected duration of a master's degree is 2 years, most students take more time to finish it.

Available data for 1997 (and referring to 944 women and 940 men) show that only 3% of the people who concluded a Master's degree in that academic year were aged 25 years or less; 30% were aged 26-29 years, 27% were aged 30-35 years, 16% were aged 35-40 years, 10% were aged 40-45 years, 7% were aged 45-50 years and 7% were aged 50 or over years (see *Observatório da Ciência e do Ensino Superior*).

There are no precise data on the average cost of a Master's degree but the annual fees may vary between € 900 and € 5000. For instance, the minimum annual fee for a Master's course in *Instituto Superior Técnico* (in physics, chemistry, etc.) for 2003/2004 is € 2000; this value may be reduced in some cases, such as teachers, researchers and other staff from the *Instituto Superior Técnico*, research grant holders, students who support teaching activities (3-4 hours per week; 1 semester/academic year), etc.

Taking a Master's degree is the usual pathway to a *doutoramento* (**PhD**). However, people can also go straight from the *licenciatura* to a PhD, in case they have a minimum of 16 as their graduation average marks.

The number of students enrolled in PhD programmes (in the academic year 1999/2000) is 2,955, of which 45.8% are women (see *Estatísticas da Educação 1999/2000*; feminisation rate in CIDM, 2004).

Portuguese students who wish to pursue a PhD degree can do it in two different ways depending on their graduation marks: a) take a PhD programme (these are not very common in Portugal, though), which consists of 1 year of specific courses in their research area usually the same as for a Master's degree) plus 4 years for the development of an original work and writing their final dissertation; b) those with higher marks (16 or over) are from the beginning exclusively engaged in the practical development of their work/thesis, which ought to be completed within 4 years. In practice, most students take 5 to 6 years to complete their PhD.

On the other hand, the available data on the average age to complete a PhD in Portugal (see Duarte, 1996) show that this has traditionally been rather high: in the early 90's, the average PhD age was 38 years old – higher in social and human

sciences (41.9 years) and in health sciences (40.8 years); and lower in exact sciences (35.5 years) and in engineering sciences (35.7 years). The average PhD age is lower – 34 years old – when people get their PhD in a foreign university. There are no significant gender differences at this level. From 1993 onwards and namely given the introduction of new funding rules for PhD grants, we could expect that the average PhD age has been decreasing.

Available data for 1997 (and referring to 103 women and 129 men) show that only 4% of the people who concluded a PhD degree in that academic year were aged less than 30 years; 27% were aged 30-35 years, 34% were aged 35-40 years, 16% were aged 40-45 years, 9% were aged 45-50 years and 10% were aged 50 or over years (see *Observatório da Ciência e do Ensino Superior*).

A recent report on European doctoral mobility (see Mitchell, 2002) within the framework of the Socrates/Erasmus programme 1995-2001 show that Portugal (and Italy) sends the oldest students with almost no mobility of doctoral students under 25 years. A significant percentage of these Portuguese mobile doctoral students are aged 35 or over, which is an exception in the European context.

In most cases, PhD students have one supervisor at the home institution. However, there can be two supervisors, in cases of doctoral programmes where, for instance, the head of the laboratory is not a teacher at the University which will give the doctor degree, or in the so-called mixed PhD, where there is a supervisor in Portugal and another supervisor in the foreign country where some periods will be spent by the doctoral student.

There is no evaluation system for PhD supervision. When a PhD student is registered in a doctoral programme, in case of conflict with the supervisor, a third person may mediate in order to propose a change to a new supervisor.

The award of a PhD in Portugal is normally dependent upon the student submitting a written thesis and undergoing an oral examination in the presence of a jury: the Dean or his/her representative, a member of the Department, the supervisor(s), two *arguentes* (arguers, who put questions to the candidate) who may be external to the home institution.

Tuition fees for doctoral programmes show a large variation from a university and scientific domain to another. As an example, we may present the value of the annual fees in *Instituto Superior Técnico*, where for instance there is a PhD programme in Physics, for 2003/2004: € 3000; this value may be reduced in some cases, such as teachers, researchers and other staff from the *Instituto Superior Técnico*, research grant holders, students who support teaching activities (3-4 hours per week; 1 semester/academic year), etc.

Most doctoral students live on **grants** given by the *Fundação para a Ciência e Tecnologia – FCT* (Foundation for Science and Technology). Although these grants still include grants to support the Master's dissertation, these will be given to candidates presenting curriculum with an exceptionally high merit only, clear priority being allocated to post-doctoral and doctoral grants.

Post-doctoral grants are addressed to PhD holders who have obtained the PhD degree, preferably less than 5 years ago, to develop advanced research in Portuguese or foreigner universities or scientific institutes – this grant is usually given yearly, up to 6 years (a mid-term evaluation is done after the 3 first years); a length lower than 3 consecutive months is not accepted. Mobility relative to the institute in which PhD was done and, particularly, mobility from PhD holders from foreign universities who wish to develop post-doc work in Portugal is valued in the evaluation of applications.

PhD grants are addressed to graduates holding a *licenciatura* or a Master's degree to develop PhD work, including the frequency of doctoral programmes, in Portuguese or foreign universities – this grant is usually given yearly, up to 4 years; a length lower than 3 consecutive months is not accepted.

Specific PhD grants are given (through the *Agência de Inovação – AdI*, i.e. Innovation Agency[4]) to graduates holding a *licenciatura* or a *mestrado* who wish to develop PhD work in a business environment, in the country, with a research issue relevant to the corresponding company – this grant is usually given yearly, up to 4 years; a length lower than 3 consecutive months is not accepted. Another type of grant, addressed to *licenciatura, mestrado* or *doutoramento* holders, is aimed at the mobility and

[4] AdI is a company with public capitals created in 1993 whose only shareholder is FCT. It has been charged of the executive management and follow-up of FCT investment programmes

knowledge and technology transfer between R&D institutes and business enterprises and other public or private bodies developing activities with a economic, social or public administration nature – this grant is usually given yearly, up to 3 years; a length lower than 3 consecutive months is not accepted.

Other advanced training grants are also available from *FCT*:

- probation grants, to the training of engineers in international scientific and technological bodies, such as CERN, ESA and ESO – a total number of 102 grants were given as to CERN, 66 as to ESA and 13 as to ESO, between 1996 and 2003;
- research grants, to *bacharelato, licenciatura* or *mestrado* holders, who wish to get scientific training in scientific and technological projects or research units in the country – this grant is usually given yearly, up to 3 years; a length lower than 3 consecutive months is not accepted;
- grants for scientific initiation, to *bacharelato* or *licenciatura* students, who wish to get scientific training in scientific and technological projects or research units in the country – this grant is usually given yearly, up to 3 years; a length lower than 3 consecutive months is not accepted;
- grants for research technical staff, aiming at the training, in Portugal or abroad, of technicians to support the functioning and maintenance of equipments and laboratory infra-structures of scientific and technological research institutes – the length of this grant may vary up to 3 years; a length lower than 3 consecutive months is not accepted;
- grants for the management of science and technology, to *licenciatura, mestrado* or *doutoramento* holders, who wish to get complementary training in science, technology and innovation management in scientific and technological research institutes, in Portugal or abroad - the length of this grant may vary up to 3 years; a length lower than 3 consecutive months is not accepted.

Researchers holding a PhD, resident in Portugal or abroad, may also apply, through *FCT*, to specific lines of support to their labour market integration:

- support to PhD holders insertion in the research career in higher education public institutes;

aiming at the promotion of scientific and technological research developed in collaboration between research institutes and companies.

- support to PhD holders insertion in the research career in state laboratories or other research public institutes;

- support to the engagement of PhD holders with a permanent labour contract in public or private research institutes (wage costs are co participated for a limited period);
- support (through AdI) to the engagement of Master's and PhD holders in business enterprises (wage costs are co-participated for a period up to 3 years) - a total number of 165 applications were presented between 1997 and January 2004, of which 148 were funded – 77 PhD and 71 Master's holders;
- support to the insertion of Portuguese PhD holders living abroad (during the previous year and who do not had a labour contract with a Portuguese body nor a FCT grant) in the national scientific and technological system - creation of a specific support and information office and co-funding of travel and settlement costs – for a period of at least 3 years.

According to the type of grant and the situation of the candidate, grants may include several components, with a different value for grant holders developing their activities in Portugal or abroad (as follows):

Allowances for monthly subsistence:

Type of grant	Portugal	Abroad
Post-doctoral grants Other grants for PhD holders	€1,495	€2,245
PhD grant PhD grant in business enterprises	€980	€1,710
Other grants for Master's holders Probation grants in international scientific and technological bodies		€1,530
Grant for scientific initiation	€385	
Other grants for *licenciatura* or *bacharelato* holders	€745	€1,450
Other grants for people with no academic degree	€565	

Note: the value of the allowance for monthly subsistence of the grants for science and technology management in the country may vary, according to the academic qualification of the grant holder, between the values referred to above plus € 500.

Other allowances

Type of allowance	
Travel – Europe	€750
Travel – Out of Europe	€1,000
Settlement	€1,000
Presentation of work in scientific meetings (post-doctoral, PhD and Master's grants)	€750
Edition of PhD thesis	€750
Edition of Master's thesis	€500

Maximum co-funding in registration, enrolment and tuition fees of PhD or Master's grant holders	
In Portugal – PhD	€2,750
In Portugal – Master's	€2,250
Abroad	€12,500

Specific grants aiming at the promotion of the participation of Portuguese post-doc young women researchers in life sciences – L'Oréal Grants for Women in Science – were very recently created (27th November 2003), by a protocol between L'Oréal Portugal, UNESCO National Committee and *FCT*. Two studies grants (€ 10,000 each) will be awarded in each year to female researchers aged up to 40 years who got their PhD less than 5 years ago and who wish to develop advanced research in Portuguese universities or research scientific institutes.

Other advanced training grants are given by various private bodies, such as, for instance, *Fundação Calouste Gulbenkian, Fundação Oriente, Fundação Luso-Americana para o Desenvolvimento,* although covering a much smaller number of people and usually with a more focused scope, compared to *FCT* grant system.

The analysis of the characteristics of the grants system shows that the internationalisation of the advanced training is a strategic goal, specific support being given to Portuguese students taking their advanced studies abroad.

But it is interesting to notice a new reality which is evidenced by available data on **post-graduate students' mobility**; i.e., in recent years Portugal has also become a receiving country: in 1999/2000, 11,177 non-national tertiary education students were taking their studies in Portugal (see: EUROSTAT, *S&T statistics, UOE questionnaire*).

On the other end, restricting the analysis to doctoral mobility within the framework of the Erasmus programme over the period 1995-2001 (see Mitchell, 2002), a relative

balance between the actual number of doctorands 'sent' and 'received' is noticeable, although with a prevalence of those who are 'received': Portugal is the home country of 136 of these doctoral students and the host country for 156 of those.

The same kind of conclusion is stressed by a *FCT*'s document on advanced training policy (*Política de formação avançada e qualificação de recursos humanos da FCT*). In 1998, *FCT* started giving PhD and post-doctoral grants in Portugal to foreigners without requiring one year of official residence in the country (as it was the case until then). At this same year, the number of foreigners taking their PhD or post-doc in Portugal was very small; in 2001, over 300 foreigners were taking their post-graduate studies in Portugal (more post-docs than PhDs). These represent 56% of the post-doctoral grants and 11% of the PhD grants to the development of studies in Portugal. About 40% of these foreigner post-doctoral grant holders are coming from other EU countries, USA or Canada; about 20% come from Eastern European countries, namely Russia, Ukraine and Romania; about 20% come from China, 22% from India and 7% from Brazil. The equivalent percentages referring to foreigner PhD grant holders in Portugal are, respectively, 25%, 27%, 14%, 0% and 21%.

On the other hand, leaving the country to study abroad is a common feature for Portuguese PhD students. Taking the figures on the PhD *FCT* grants running in 2001, we conclude that about one half were for studies in Portugal; this means that about one half of Portuguese PhD students do their work abroad, either for the complete duration of the PhD or for shorter periods of time.

Still taking *FCT* figures for 2001, we see that about one third (about 150) of the post-doctoral grants had been given to grant holders taking their studies abroad. Among these post-doctoral grants in foreign countries, 62% took place in the EU and 30% in the USA. This is a different picture compared to the distribution of the PhD grants abroad, since these are more concentrated in the EU. Among a total of about 1,600

doctoral and post-doctoral grants abroad, 76% were taking place in the EU (about 560 in the United Kingdom, 180 in France, 160 in Spain and the rest in other countries) and 20% (about 300) in the USA.

It is interesting to quote the statements of the President of *FCT* about issues like brain drain and the hiring of foreign researchers.

"Q - There are many grant holders abroad who do not come back.
A – That depends on the fields. In health sciences, people come back more often.
Q – But in physics, astronomy, they do not come back.
A – In those fields, we only have two research facilities (…). It is also important to train Portuguese young researchers to work at the large international science centres, to make a connection with the Portuguese research. But this has to be carefully done, to prevent that all of them stay there. I tried to verify that the effort to open new job places here is conducting to the hiring of foreign researchers. That was not quite the idea. Of course it is important to have qualified foreign researchers in Portugal, but we can not waste high quality young people who have been trained, for instance in health sciences."
Source: Interview with Fernando Ramôa Ribeiro (President of *FCT* – Foundation for Science and Technology) *in* Jornal *Público*, 6th January 2003.

Another way of looking at this same issue of post-graduate students' mobility, now using a gender 'lens', is the analysis of the percentage of women among all PhD holders; this percentage is higher among those who took their PhD in Portugal than among those who took it abroad. However the figures referring to 2002, compared to those referring to the period 1970-2002, seem to represent a possible change in this trend, since the percentage of women among all holders of a PhD completed abroad rose from 31.7% to 41.4% in this last year.

Percentage of women among all holders of a PhD completed in Portugal:
2002: 46.9% 1970-2002: 40.4%
Percentage of women among all holders of a PhD completed abroad:
2002: 41.4% 1970-2002: 31.7%

Sources: Observatório da Ciência e do Ensino Superior, Doutoramentos realizados ou reconhecidos por Universidades Portuguesas, April 2003.

Diário da República (II Série): Listagem semestral dos diplomas do grau de doutor obtidos no estrangeiro e reconhecidos em Portugal ao abrigo do DL nº 216/97, 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 nº 93/96, de 16 de Julho.

Restricting this analysis to the doctoral mobility within the framework of the Erasmus programme over the period 1995-2001 (see Mitchell, 2002), we see that more than 50% of these mobile doctoral students coming from Portugal were female.

A nationwide organisation of young grant holder researchers was recently created, on February 2003, in Portugal – *ABIC – Associação dos Bolseiros de Investigação Científica* (Scientific Research Grant Holders Association). The aims of *ABIC* are to fight for better conditions for young researchers and to promote conditions for the creation of employment for young scientists. The main **problems** currently concerning Portuguese PhD students, post-docs and other young researchers identified by *ABIC* are: poor research infrastructures – laboratories, computers, libraries, travel funds; poor career perspectives, both in the private sector (no innovation tradition and no investment in R&D) and in the public sector (very few vacancies in state laboratories and universities); poor social security benefits.

A new **Status of scientific research grant holders** is required by *ABIC*. The current Regulation (Decree-Law nº 123/99) defines a set of rules which are considered as disadvantageous for grant holders by *ABIC*: although grant holders do not have a status of employed person, they may register for a voluntary social insurance contributory scheme (as long as their grant is equal or longer than 12 months)[5], but this scheme, for instance, does not give right to social security coverage in case of

unemployment; grant holders are compulsory committed full-time and on an exclusive basis to the activities funded by the grant – therefore grant holders are not allowed to teach, for satisfying permanent needs of higher education institutes; grant holders are not allowed to other social benefits such as paid holidays or Christmas allowance.

[5] This includes foreigner grant holders irrespectively of the period of residence in Portugal.

According to the current Regulation, grant holders may suspend the activities funded by the grant in case of maternity, paternity, adoption, assistance to sick children, disabled or other relatives (according to the law applicable to civil servants). Only in case of maternity, the extra period of the grant corresponds to an extra amount of the grant.

ABIC also complains about the amount of the grants, claiming that this should have the wage level of employees with equivalent qualifications as a reference.

4. The research career trajectory – recruitment and progression

Most researchers **remain as grant holders** for a very long period of time, going from a grant to an application to another grant and to the next grant, due to lack of employment opportunities; these grant holders refer that it is very difficult to get a permanent job in a scientific career.

One year ago, a national newspaper (*Jornal Público*, 1st February 2003) described the situation in major Portuguese research institutes as an unbalanced one, with a much larger number of grant holders than permanent researchers. Two examples were given: the *Instituto Nacional de Saúde Ricardo Jorge*, a state laboratory related to the Ministry of Health, with 30 permanent researchers and 60 grant holders; and the *Instituto Gulbenkian de Ciência*, a *laboratório associado do Estado* (laboratory associated to the State), with 3 permanent researchers and about 130 grant holders (in this second case, the unbalance is justified by the fact that this is a training institute, aiming at promoting mobility among institutes, according to its responsible persons).

Several people interviewed by this same newspaper, people with particular responsibilities at the management of scientific research institutes, agree on the fact that there is a lack of scientific employment and that this is a real problem for the country. They also say that grant holders are not well treated and that their work is not fairly valued. Another problem raised has to do with the ageing of the permanent scientific staff and the need to admit new qualified researchers, which has been very difficult in recent years, namely in state laboratories given the ‘freezing’ of new

admissions to the civil service. On the other, it is recognised that alternative scientific jobs in private companies are not an option in Portugal, given the lack of entrepreneurial investment on R&D.

We may quote another journalistic piece which was also published last year (in *Visão*, 20th February 2003). Based on interviews with several Portuguese male and female mobile scientists, this journalistic piece concludes that 'there is no place for knowledge' in Portugal. The researchers interviewed have all experienced **difficulties** in finding a scientific job in Portugal in most cases after having spent a shorter or longer period abroad: either in Europe or in the USA. The best some of these scientists could get is a research grant for a limited period of time; some are considering going abroad in order to get a job compatible to their qualifications, since they are now doing all sorts of things to survive - this is the case of one woman who is selling insurances after having got a PhD in biochemistry two years ago; some are even considering going back, as soon as they can, to the foreign country from where they have recently returned (this time probably for good, they say), tired of waiting for the outcomes of the applications they made for research funding bodies in Portugal or tired of seeing their research proposals not approved by these same bodies.

The application to a grant is thus a common way out, even for experienced researchers. Besides the grants already described above, these experienced researchers may apply to the following **grants** from *FCT*:

- grant for invited scientist, to university teachers or researchers with a high merit scientific curriculum who wish to develop activities in Portuguese scientific and technological research institutes - the length of this grant may vary between 3 months and 1 year and can not be interrupted;
- grant for scientific career development, to researchers who have shown high scientific merit in the activities developed during a post-doctoral period, usually

  4 to 5 years - the grant is aimed at supporting the improvement of scientific projects management and co-ordination skills – this grant is given yearly, up to 5 consecutive years, as long as there are positive interim evaluations; a period lower than 1 consecutive year is not accepted;
- grant for sabbatical leave, to PhD holders in a sabbatical leave period who wish to do research in foreign institutes – the length of this grant may vary between 3 months and 1 year.

The following amounts of allowance for monthly subsistence correspond to these grants:

Type of grant	Portugal	Abroad
Grant for invited scientist	€2,650	
Grant for scientific career development	€2,060	
Grant for sabbatical leave		€750

Entry into the scientific research career does not, therefore, show to be easy for young (and not so young) researchers. In 1999, a new Status of the Scientific Research Career was defined (Decree-Law nº 124/99). This Regulation aims at promoting, in particular, the qualification and the internationalisation of human resources; the requirement of a PhD degree to entry into the career; the bringing near of the research career and the higher education teaching career[6] and the mobility between these; the access to places through external application; among others.

This **Regulation** applies to the research staff in every public institution pursuing scientific and technological research activities: state laboratories and higher education institutes.

Aiming at the improvement of the exchange of knowledge at a national and international level and the scientific cooperation of Portugal with other countries, the *investigador convidado* (invited researcher) is proposed in this Regulation as a

privileged instrument for the constitution of multidisciplinary and international research teams.

The scientific research career develops, from the basis to the top, in the following **categories**: *investigador auxiliary* (auxiliary researcher)*, investigador principal* (principal researcher)*, investigador coordenador* (co-ordinating researcher).

There is also specially assigned research staff. This is the case of the *investigador convidado* (invited researcher), who may be a national or a foreign person (namely

[6] Higher education teaching staff is also expected to develop, individually or in group, scientific research (see Decree-Law nº 448/79, of 13th November).

under the scope of international mobility programmes), whose specific qualification and specialization is considered essential for the activity of the institution at a given moment and for a certain period.

As an exception (and also as specially assigned research staff) research activities can also be developed by *assistente de investigação* (assistant researcher) or by *estagiário de investigação* (research trainee). These categories were formerly defined in a time where there were few Portuguese doctorates; they are no longer compatible with the basic requirement, now imposed, of the holding of a PhD degree for the entry into the scientific career.

Research career staff may be **recruited** through documental application, transfer or permute. They can also be requested (through *requisição*) or detached (through *destacamento*).

To apply for a documental application for auxiliary researcher, candidates, holding a PhD degree, must present their curriculum and their scientific work.

To apply for a documental application for principal researcher, candidates must show a minimum of 3 years of experience as auxiliary researchers or must have been approved in *habilitação* or *agregação* public proofs. Their curriculum, scientific work and a report of their activities will be considered for evaluation.

To apply for a documental application for co-ordinating researcher, candidates must show a minimum of 3 years of experience as principal researchers and must have been approved in *habilitação* or *agregação* public proofs. Their curriculum and scientific work will be considered for evaluation.

Documental applications for these categories are dependent on the existence of vacant places in each of them. Evaluation criteria to be considered are the quality of the scientific and technical work of the candidates; their professional experience; their professional training; their contribution in terms of scientific supervision, participation in management bodies and service to the community.

The recruitment of staff for the categories of research trainee or assistant researcher is done by documental application, complemented through interview, among the

candidates who hold a *licenciatura* (with the minimum classification of Good) or a Master's degree, respectively.

Auxiliary, principal and co-ordinating researchers are **appointed** with a definitive title. However, each three years, they have to present a curricular report to the scientific board.

Invited researchers are appointed for a defined period of time, up to 5 years. They may be re-appointed for periods of equal duration. Trainee and assistant researchers are appointed for 1 year, renewable for two 2 years periods.

Research staff may work on an exclusive dedication basis or on a full-time basis (according to their own option). Specially assigned research staff can be allowed to work on a part-time basis.

Researchers may be **exempted of service**, without loosing any rights, for one year, each six years, in order to develop research activities or other personal valorisation and public interest tasks in other national or foreign bodies, as well as to teach in public higher education institutes or, also, due to reasons of scientific and technical up-date. This service exemption may be enjoyed in six months periods, each three years.

Pay levels of scientific research staff are also regulated by the same Decree-Law nº 124/99. Pay supplements are due to people who live abroad at a permanent basis and who are appointed as invited researchers, as a means to compensate for travel costs and as a residence allowance (equal to the coming and return travel plus 30% of the basic wage, for the 1st year of the contract).

Research staff's pay is organised according to the career categories and, within each category, by levels, based on seniority. The 2003 levels are as follows:

	Level 1	Level 2	Level 3	Level 4
Co-ordinating researcher	€4,217.23	€4,439.19	€4,587.16	€4,883.11
Principal researcher with *habilitação* or *agregação*	€3,625.34	€3,773.31	€3,921.28	€4,217.23
Principal researcher	€3,255.41	€3,403.38	€3,699.33	€3,847.30

Auxiliary researcher with *habilitação* or *agregação*				
Auxiliary researcher	€2,885.47	€3,107.43	€3,403.38	€3,625.34
Assistant researcher	€1,997.64	€2,071.62	€2,219.60	
Research trainee	€1,479.73	€1,627.70		

Recruitment and progression in the scientific research career is thus formally regulated. In practice though this is a career in which entry is difficult, especially given the lack of vacant places in research bodies. That is the reason why being a grant holder often turns into a 'profession' for many researchers in Portugal.

5. Concluding remarks

Scientific labour market in Portugal seems to be enlarging and opening to new realities, but it still shows rather small and concentrated, lacking of qualified human resources and offering limited prospects for career progression and well paid and secure positions.

A consistent growth in the number of qualified researchers (although still at low levels, for instance compared to the EU average situation) has gone in parallel with a strong increase of the participation of women in the upper levels of education, which contributed to a rather new 'panorama' in terms of academic qualification and job opportunities, namely in science, for women and men.

However, scientific research is still highly concentrated in academia and public research bodies. If the increase of R&D activities in industry sector is among the current science policy goals, this has proved to be very hard to achieve.

Most post-graduate students live on grants given by *FCT*. This grant system has contributed to encourage post-graduate students' mobility. In 2001, over 300 foreigners were taking their post-graduate studies in Portugal (more post-docs than PhDs). And

in the same year about one half of Portuguese students with a PhD grant and one third of post-doctoral grant holders were doing their work abroad.

The main problems concerning Portuguese PhD students, post-docs and other young researchers currently identified by *ABIC* are: poor research infrastructures; poor career perspectives, both in the private sector (no innovation tradition and no investment in R&D) and in the public sector (very few vacant places in state laboratories and universities); poor social security benefits.

On the other hand, most researchers remain as grant holders for a very long period of time, due to lack of opportunities of getting a permanent job in a scientific career. Finding a scientific job in Portugal even shows a difficult task for experienced researchers who decide to return after having spent a shorter or longer period abroad, either in Europe or in the USA.

Could we, thus, conclude that '*there is no place for knowledge'*? We trust that this is a too strong statement, but any case, there seems to be no doubt that doing scientific research is not an easy career pathway in a country like Portugal.

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