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## **Brazilian Post-Graduate Education: emerging challenges to a successful policy**

Elizabeth Balbachevsky\*

Higher education in Brazil is well known for its many problems. Nevertheless a place exists for pride among Brazilian faculty and policy makers, it is the country's post-graduate education. In fact, its figures are impressive: in the year 2000, more than 57,000 students were enrolled in master's programs and other 30,000 were enrolled in doctoral programs. In the same year, more than 18,000 masters and 5,000 doctors graduated in Brazilian higher education institutions (see Table 1). These figures place Brazilian post-graduate education among the most impressive in developing countries.

The achievements of the Brazilian post-graduate education are not only associated with its size. There is quality also. Since the late 1960s this layer has been subjected to a consistent set of policies aiming at assuring both growth and quality. In the mid-1970s, The Fundação Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES), the Ministry of Education's agency in charge of post-graduate education, created a sophisticated peer-review evaluation that successfully links performance with support. This evaluation system had a decisive impact on the Brazilian post-graduate education development. It successfully limited growth without quality and imposed minimal performance standards for the post-graduate programs nationwide.

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**Table 1 - Brazilian Post-graduate Education: students enrolled and graduated by academic field and degree - year 2000**

	Master's programs		Doctorate programs	
	enrolled	graduated	enrolled	graduated
Physical Sciences	9.3	9.8	13.6	13.6
Biological Sciences	6.7	8.3	11.8	12.5
Engineering	16.6	14.7	16.7	13.2
Health Professions	13.9	15.7	15.3	19.5
Agricultural Sciences	8.7	10.9	9.7	10.3
Administrative and Legal Professions	17.8	14.8	8.7	8.3
Humanities	16.9	16.8	17.1	16.7
Arts and Literature	6.6	6.0	5.7	4.8
Multidisciplinary	3.3	2.9	1.4	1.1
Total (100%)	(57,059)	(18,132)	(30,272)	(5335)

Source: CAPES, Coordenadoria de Estudos e Divulgação Científica.

In spite of its success, post-graduate education in Brazil faces important challenges in the present. In this paper, we will sketch a portrait of the Brazilian post-graduate education summarising its trajectory, presenting new data about its public and pointing out the most relevant challenges it faces in the new environment created by the 1990's reforms.

### **Brazilian post-graduate education: a brief history**

The origins of the post-graduate studies in Brazil can be traced to early experiences with the chair model adopted by the Brazil universities in the 1930s. In those years Brazil attracted a significant number of foreign scholars: some of them came in special missions organised by the Brazilian authorities in collaboration with foreign governments, others entered Brazil as refugees from the European turmoil of the 1930s. With the foreign scholars came the first institutional model for post-graduate training. Pursuant to that model, post-graduate studies were conceived of as an apprenticeship. Central to this model was the tutorial

relationship between a full professor and few students, who were supposed to assist the Professor as teaching and/or research assistants. Training were mostly informal and were centred on the student's dissertation. The authority of the Professor was almost absolute: it was his/her sole responsibility to assign the assistant's load of academic work, to determine the acceptable subjects and methodology, and to establish the standard of quality for the dissertations.

These few earlier experiences in post-graduate education had little impact on the higher education system as a whole. It was a small enterprise more or less tolerated by the academic authorities. The master's or doctoral degree had no currency outside the academy. In most cases, post-graduate activities were supposed to be one of the thresholds (but not the only one) to the institution's academic career.

Only in 1965 did the Ministry of Education take the first steps to recognise and regulate this experience as a new educational level. Its main organisational features were sketched by the Report 977, enacted by the Federal Council of Education (known in Brazil as *Parecer Sucupira*). This Report created the two level format for the post-graduate studies, where students were supposed to successfully conclude a Master program prior to being accepted in a Doctorate program.

At that time Brazil was under an authoritarian regime with important nationalistic orientations. The regulation of the post-graduate layer points out the Government's awareness of the potentialities of advanced training. Its role as a domestic alternative to qualify academics for the growing federal network of universities was, most probably, the chief motivations for the growing interest shown by the governmental authorities.

After the 1968 reform<sup>1</sup>, post-graduate studies in the most prestigious Universities became semiautonomous programs to be overviewed by the newly organised departments, which were supposed to replace the old Chairs. In the new institutional framework, the post-graduate studies incorporated new features, which represent a compromise between the old Chair model and the new American model adopted by the 1968 reform. In the new format, the tutorship was preserved but relations between the candidate and his/her tutor were now to be supervised by the post-graduate program's board. To successfully conclude the post-graduate

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<sup>1</sup> In 1968 the Federal Government enacted a bill seeking to reorganise the Brazilian universities after the U. S. model. This reform replaced the old chair system with the department model, adopted the full-time contract for faculty and substituted the traditional sequential course system for the credit system.

studies, candidates were supposed to follow a specialised curriculum to be complemented by the public defence of a thesis before a board of examiners –three in the case of a master degree and five for the doctorate.

But the decisive change emerged when the post-graduate programs came to be defined as a privileged focus for policies adopted for Science and Technology (Schwartzman 1991) in the early 1970s. In those years S&T policies were in the verge of a major change: for the first time, the Brazilian government was attempting to place science and technology as a means to attain economic development. This initiative can be best understood if one takes into account the consensus then built between influential scientists (some of them with well-known leftist orientations) and the nationalist sector in the Brazilian army, both supporting the idea of building an important sector of science and technology as an instrument for the country's economic development. From the science elite's point of view, the assumption was that with adequate economic incentives private investors would change their attitude from technology consumers to technology developers. This transformation would warrant the country to break away from the technological dependency, that was then perceived as one of the most important sources of economic underdevelopment. From the Armed Forces' perspective, this objective was important also as a means to ensure the access to sensitive technology in strategic fields such information technology, aeronautics and nuclear energy. In these convergent perspectives, investments should be concentrated in a few large strategic projects from which scientific and technological competence were supposed to *trickle down* to the economy and the society.

Graduate education were then perceived as an important tool to fulfil this goal. It was supposed to supply the sophisticated human capital deemed necessary for implementing these projects. Accordingly the Brazilian government also launched an important program of scholarships for master and doctorate students abroad. This program greatly expanded the number of fellowships offered by foreign foundations such as the Ford Foundation and the Rockefeller Foundation, that were, until the end of the 1960s, the most important alternative for those aiming for a post graduate education abroad. It was this new generation of scientists graduated abroad that gave bones and flesh to the new post-graduate layer that were been organised in the Brazil. These young researchers came back to Brazil with a well defined picture of what should be a post-graduate program in an international perspective and were an

important instrument for the dynamism one could find in these programs even in the earlier stages.

To achieve these objectives the main investment Brazilian Bank – the government-owned Banco Nacional de Desenvolvimento Econômico (BNDES) – established a program to support technological development in 1964. The success of the Fund created pressures to its institutionalisation into a new specialised agency, The Financiadora de Estudos e Projetos (FINEP), which was in charge of a National Fund for the development of science and technology, entitled to a permanent item of the Federal Budget. In 1975 the old and small Conselho Nacional de Pesquisa (National Research Council) was reformed and transformed into a new and larger Conselho Nacional de Desenvolvimento Científico e tecnológico (National Council for Scientific and Technological Development- CNPq), placed under control of the Ministry of Planning, then one important branch of the Brazilian government.

The 1970s were years of economic expansion, in which Brazilian economy grew at annual rates of 7 to 10 per cent. As such, these new agencies had funds to spend, and a flexible and modern bureaucracy, not constrained by the rigid controls one found in other governmental offices . Their first attempts were directed towards stimulating private and public firms to invest in technological development. But these initiatives were mostly doomed to fail due the firms' lack of interest in investing in such a risky enterprise, being placed, as they were, in a highly protected environment created by the macro-economic import substitution policies. Then, they turned their attention towards the informal research environments to be found in some of the most prestigious universities, where some scientific tradition was in place. The new roles assigned to science and technology were acclaimed with enthusiasm by the research leaders. As stated by the founder of one of the country's most prestigious post-graduate programme in engineering, Alberto Luis Coimbra

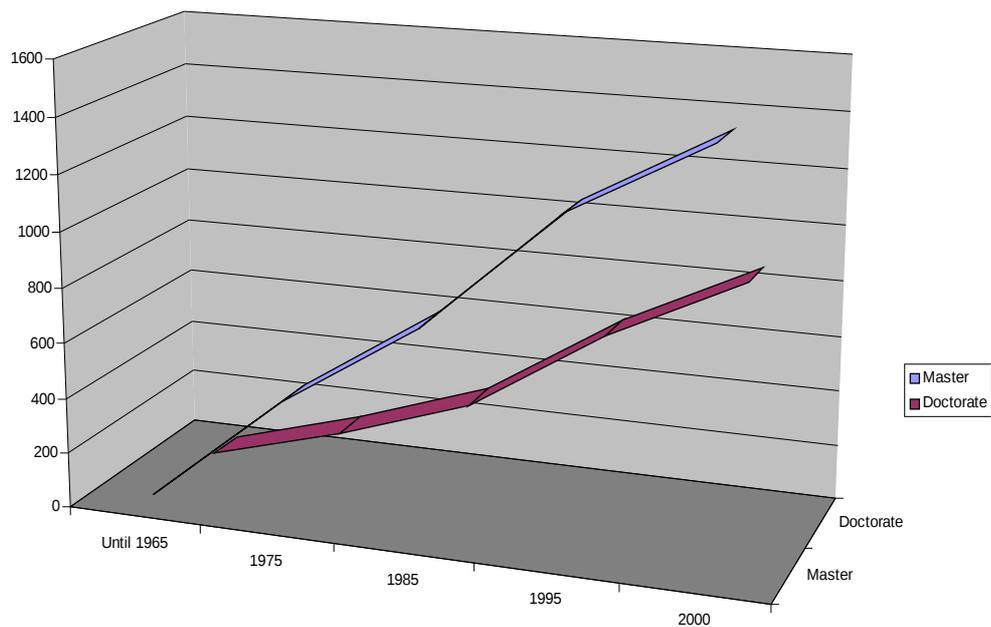
“ [The Program] was created to form a kind of new professional Brazil did not have at the time. One at the master's and doctoral levels. We believed that people with these qualifications were necessary to the country's technological development (...) We lacked graduate people who could create new technology... “:(as quoted by Schwartzman, 1991, p. 229)

The strategy adopted by the S&T agencies was to search for the talented people in the academic institutions and provide them with the necessary direct support in research

infrastructure and staff. Often, the agencies preferred to deal directly with the research leaders, bypassing university's procedures and bureaucratic controls. This strategy assured that resources were spent where they were deemed necessary. But it also meant that the universities as whole were unable to benefit from the new investments. A two tier and unequal system began to develop inside the public universities: well staffed and equipped post-graduate programs and departments were to be found side by side with poorer departments, the latter oriented toward the more traditional role as faculty of undergraduate courses (Schwartzman 1991) .

With such support, post-graduate education in Brazil grew at a great pace. In 1965, when the post-graduate studies were recognised, the National Education Council accredited 38 post-graduate programs: 27 as master's degrees and 11 as doctorate. Ten years later, in 1975, there were already 429, MA programs, and 149 doctoral programs. As one can see in Graphic 1, these figures grew continuously since then. In 2,000, there were in Brazil 1,420 accredited MAs and 865 doctorates.

While FINEP and CNPq favoured hard science and engineering; the Ministry of Education tended to support a broader range of fields; being focused, as it were, on faculty qualification. Since the majority of the undergraduate courses were in soft science, its policy tended to favour post-graduate programs in these areas. In the end, with the overlap of policies of these two stakeholders, post-graduate education in Brazil became fairly well distributed among the major academic fields. As one can see on Table 1, above; in 2,000, while 32.6% of the students enrolled in master's studies were attending programs in biological and physical sciences, and engineering, other 41.3% were enrolled in programs in humanities, legal and administrative professions or literature and arts. Besides, 13.9% were attending master's programs in health professions and agricultural sciences responded for 8.7% of the enrolments. The patterns of enrolment for the Doctoral level is more or less the same. Here, hard science has a small advantage, with 42.1% of the students attending programs in physical and biological sciences or engineering, while only 31.5% of the students were enrolled in humanities, legal and administrative professions or literature and arts. The difference is associated to a sharp decrease in the enrolments at the doctoral level in the soft professions (legal and administrative professions) and a smaller increase in the enrolments in physical and biological sciences.



**Graphic 1 - Brazil: Total number of graduate studies programs by degree**

### **The quest for quality and evaluation**

The 1965 Post-Graduate Report conferred on the Ministry of Education's Conselho Federal de Educação (Federal Education Council)<sup>2</sup> the responsibility for the programs' accreditation and evaluation. However, its earlier attempts to fulfil this role failed, for the lack of appropriate mechanisms and procedures. New post-graduate programs were being created very rapidly, while the Council was slow in providing the necessary guidelines for accreditation and evaluation.

Lacking general standards, the S&T agencies had few clues in choosing to support or dismiss collective research and post-graduate programs. While CNPq had some experience in peer review procedures, they were mostly employed in rating individual projects not programs as a whole. For the research groups, to attain high quality standards was crucial: it meant independence from the agencies' internal struggles and was perceived as an alternative for preserving the prestige associated with post-graduate education. The solution for this

<sup>2</sup> The Conselho Nacional de Educação is a special assembly of education stakeholder representatives that works as an auxiliary body of the Ministry of Education, dating from the 1930s. It overviews curricula contents in all education levels, accredit new undergraduate programs proposed by non-university institutions and supervise schools and universities nation-wide.

impasse were reached when CAPES - a Ministry of Education's agency originally in charge of providing scholarships for faculty and post-graduate students - organised the first general evaluation of post-graduate programs in 1976. The procedure was supposed to serve as guideline for allocating the students' scholarships (Castro and Soares, 1986). In order to assure credibility, CAPES opted for extending the peer review procedures in evaluating the collective outputs of the program's faculty. In each academic field, prestigious scholars were brought in as consultants to work in committees, which were in charge of evaluating and ranking the post-graduate programs. The work of these committees had a major impact on the institutionalisation of academic research in Brazil. They became a major forum for establishing quality standards for research and academic career, for legitimising subjects of study, theories and methodologies, and for evaluating international links and publishing patterns (Coutinho 1996). As thus, the work of the evaluation committees were very helpful in expediting the institutionalisation of all fields of knowledge and in building the foundations of the Brazilian scientific community.

Eventually, the CAPES evaluation was accepted by all stakeholders as a quality reference for post-graduate programs. So, it successfully connected performance with reward: the better the program evaluation, the greater its chances for accrued support as expressed in students scholarships, and research infrastructure and funds. Such situation stands in clear contrast with all others policies regarding higher education in Brazil, where until now the government has not succeed in relating performance to rewards.

In spite of its positive aspects, CAPES evaluation had some hindrances that became more and more apparent as time went by. The small size of the Brazilian scientific community and the visibility of the peer-committees work created unavoidable parochial pressures. One consequence was grade inflation. (Castro and Soares 1986; CAPES 1998). In 1996, four in every five programs were placed in the two highest ranks, A or B. It meant that CAPES evaluation were quickly loosing any discriminating role.

Reacting to this situation, CAPES authorities established in 1998 a new model for program evaluation. This new model preserves the authority of the peer-committees, but adopts more formal rules for evaluation. It reinforces the adoption of international standards for all fields of knowledge; imposes a set of parameters for faculty evaluation, stressing their academic background and research performance as measured by their publishing patterns; extends the periodicity of evaluation from two to three years; adopts a more comprehensive

procedure, evaluating master's and doctoral programs together, instead of evaluating each program per se; and adopts a scale of seven points (instead of five), where the ranks of 6 and 7 is restricted to programs offering doctoral degrees that could be qualified as good or excellent by international standards, and establishing that 3 was the lowest acceptable rank for successfully accrediting a post-graduate program. The 1998 evaluation round proceeded under these new rules. The results were satisfactory from the agency's point of view: using the new criteria, only three out of ten programs were ranked in the three highest positions (CAPES 1999).

As said above, the whole process gave rise to a growing dynamic post-graduate tier inside de Brazilian higher education system. Nevertheless, hopes of a big impact on the country's capabilities for technological innovation have not been fulfilled. The new professionals formed by this system were, most often, absorbed in the academic area, and few created solid links with the outside world. As also stated by Professor Coimbra:

“We created the graduate programs for a Brazil that did not exist and still does not exist, which did not correspond to what we expected to happen. We were throwing into the market a sophisticated product for the country's technological development...But it never happened” (Schwartzman 1991 p. 229).

Thus, the post-graduate tier is the pride of all Brazilian scholars, but it is facing some important challenges in the new century, as the next sections will show.

### **The regional inequalities**

The direct support provided by CAPES and other S&T agencies to the high-quality programs allowed them to engage and secure the best researchers as faculty. So, the university's success in developing a broad post-graduate tier became an important source of stratification inside the public sector in Brazil<sup>3</sup>. At the top, one finds a small number of universities strongly motivated by academic standards, where academic research is permanent and fully institutionalised. These institutions provide a better working environment, which in

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<sup>3</sup> Post-graduate education in Brazil is limited mostly to public universities, with. private institutions playing a minor role. In 1998, only 10% of the MA and 9.3% of the PhD programs were to be found in the private sector.

turn allows them to attract and secure better-qualified faculty as well as financial support for research. These institutions confer the majority of the doctoral degrees granted domestically.

However, many public institutions were unable to develop a strong post-graduate tier. As a consequence, they have problems in bringing in and retaining doctorate holders among their faculty. As a result they reinforce their previous orientation towards undergraduate education. In such institutions, research environments can only be found in isolation in what has been described as small “isles of excellence” (Oliveira 1984). These environments are usually big enough to support small master’s programs but only more rarely can they afford granting doctorates. So by the new CAPES evaluations rules, such programs are by definition placed in the middle rank, whatever are their performance, since the two highest positions are reserved for programs that confer doctoral degrees. In spite of all these hindrances, the institutions placed in this stratum are responsible for more than 50% of all enrolments at MA level in Brazil (Balbachevsky and Quinteiro 2002).

As one could expect, this stratification has also a regional component. As one can see in Table 2, the south-east – the more modern, industrialised and urbanised region in the country - concentrates 65% of all students enrolled at the master level and 80.5% of those enrolled at doctoral level. At the other extreme, the northern region has only 1.1% of all post-graduate students. But the most expressive indicator of inequality is expressed in the last column of this table. Here the size of post-graduate system is shown as a proportion of each region’s population. As one can see, in 2.000, there were 8,5 post-graduate students per 10,000 habitants in the south-eastern region. The southern states, with modern industries disseminated in a network of small dynamic urban centres and a fairly educated population, had 5.6 post-graduate students per 10,000 habitants. The centre-western region is not so badly positioned: here there were 2.7 post-graduate students per 10,000 habitants. Here, the presence of the Country’s capital, Brasília, and the academic profile of its federal university, the Universidade de Brasilia, explains this figure. The worst results are to be found in the densely populated but poor states of the north-eastern region, where one could find only 0,2 post-graduate students per 10,000 habitants. The situation found at the sparsely populated northern region were not much better: only 0.7 post-graduate students per 10,000 habitants.

**Table 2 - Brazil: total of post-graduate enrolments by degree and enrolments per 1,000 habitants by region – 2000.**

	Enrolments by degree level		Total	Total enrolments per 10,000 habitants
	Master	Doctorate		
centre-western	4.3	2.2	3.8	2.7
north-western	10.8	4.8	9.2	0.2
northern	1.3	0.6	1.1	0.7
south-eastern	65.2	80.5	75.1	8.5
southern	18.4	11.9	17.1	5.6
total (100%)	(57,059)	(30,272)	(82,331)	Brazil : 4.8

Sources: CAPES, Coordenadoria de Estudos e Divulgação Científica and IBGE.

These regional inequalities are perceived by the society as unfair and are a source of complaint for politicians with regional constituencies. Programs and policies specially designed to deal with regional inequalities have been proposed since the late 1970s. But until now little success can be accounted for. Most of these initiatives fail because of its paternalistic approach: they earmark small portions of the S&T resources, including fellowships, to be distributed only among researchers from the north-east or the north. Such policies create reserved markets with lower thresholds open only to researchers from these regions, while supporting the ideal of an unitarian system where all universities should, in the end, follow the same model: the great research oriented university, regardless of its costs. As this model is unreachable for most institutions, specially those from the poorer states, it dispirits the faculty's moral, while, at the same time, creates a vicious circle, rewarding poor performance and poor academic standards, as long as the research group is placed in a poor region.

What is more important, these regional policies adopted by the S&T agencies fail to recognise and reward special traits of the research community in these regions. In a recent survey with research leaders from the biotechnology community in Brazil, Coutinho et al. found out that research groups from these peripheral regions are more prone to open their research agenda to societal needs and demands than those belonging to the more academically oriented central universities (Coutinho, Balbachevsky, and Holzacker 2003). This observation corroborates the hypothesis that, besides resources, a more flexible set of standards – one that recognised and rewarded differentiation, while supporting quality - could be an important tool in lowering the sharp contrasts found among regions in Brazil.

## **Institutional Challenges**

Other special challenges faced by post-graduate education refer to its potential for differentiation and diversification, specially regarding multi- and transdisciplinarity. As one can see in Table 1, multidisciplinary programs are seldom found in Brazil. In the year 2000, such programs attained only 3% of the master's students and 1% of doctoral students. The causes for this situation are diverse<sup>4</sup>. First, in many cases, departments lack the academic density to offer more than one post-graduate program. Since Brazilian universities are rigidly organised in disciplinary departments, anything placed outside (or in-between) the departments chronically suffers from lack of resources, autonomy, support and prestige. Second, there is a bureaucratic impediment: at the public sector, faculty contracts are based on a standard teaching load. Greater loads do not entitle the faculty to additional material or even symbolic rewards. Finally, but not least important, for the departments, program diversification does not warrant any reward, as the lack of diversification does not imply penalty.

Besides, the evaluation process implemented by CAPES seems to fail in facing the special demands and challenges posed by multidisciplinary programs. CAPES evaluation supposes a unique disciplinary affiliation for each program. So its officials, having trouble in classifying the multidisciplinary programs, chose to subordinate them to the committee that seems the best proxy. Such choice does not always work as expected. Not rarely committees' members, lacking experience with multidisciplinary research, tend to disregard the special needs posed by such programs. It is not a surprise to find that 94% of all multidisciplinary programs accredited by CAPES were ranked between 4 and 3 in a scale of 7 positions, where 7 is the highest rank (CAPES, 1999).

## **The serial model and the over-extended completion time**

Another challenge faced by post-graduate education in Brazil is its assumption of an unusually large completion time. CAPES officials estimate that in order to conclude the master's degree, a student would spend 34 months<sup>5</sup> in average (almost 3 years). To achieve the doctoral degree, it takes additional 53 months (four and half years). Since master's programs in

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<sup>4</sup> Some of these observations were first presented at Albuquerque and Balbachevsky (2002). Evidences that this situation is widespread in Brazilian universities were collected by the author when doing the field research for the article about the Brazilian academic marketplace. See Balbachevsky and Quinteiro (2002)

<sup>5</sup> CAPES, [www.capes.gov.br](http://www.capes.gov.br)

Brazil, are regarded as an intermediate stage, an almost mandatory pre-requisite for entering a doctoral program, students spend, on average, more than seven years to get a doctoral degree.

A recent survey made with post-graduate students suggests that the average student reach the post-graduate level when he is 30 years old (Velloso and Velho, 2001), five years after finishing his/her undergraduate studies. Braga (Braga, 2002), agrees with this conclusion, showing that this span of time is growing. Students that were admitted at master programs in the late 1990s spent, on average, more years between finishing their undergraduate courses and beginning the master's program than those that were admitted in the early 1990s. Between graduating at the master level and being accepted at the doctoral level, there is also a gap of 2,5 and 3,5 years. With all those delays, the average student is supposed to finish his/her training when he/she is 37 to 42 years old.

This is a very large span of time from an international perspective and represents a huge investment from the government's point of view. CAPES estimates that, in 2002, almost 40% of all master's students and 50% of all doctoral students were supported by fellowships provided by public funding<sup>6</sup>. Besides, such unusual long training path results in shorter productive research life, when the academic would be supposedly contributing for training new researchers.

A number of measures have been taken by the Brazilian S&T agencies to counteract this trend. First the span of time covered by fellowships have been shortened from the original four to two years in the case of master's degree and from six to four years in the case of doctorate. At the time this measure was taken (in the early 1990s) it aroused great concerns among Brazilian academics, but nowadays is accepted by almost all stakeholders. Second, evaluation procedures have emphasised this requisite, penalising programs where students take more than the desirable span of time for achieving their degree (two years in the case of master's programs and four years in the case of doctorates). There were even some incentives for a training path bypassing the master's level, but until now this is a very unusual training path, even in the hard sciences, where this alternative is more generally accepted.

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<sup>6</sup> A survey with post-graduate students in Brazil in 1995, found out that 80% of all graduate students received a fellowship for at least once while enrolled in post-graduate programs. (Velloso and Velho (2001)). Since the length of time covered by the standard fellowship is two years for master students and four years for doctorate students, it's easy to see why Brazilian S&T agencies are concerned with this situation.

Follow-up studies<sup>7</sup> made with masters and doctors graduated in Brazil since the early 1990s (Velloso 2002b) clearly suggest that, at the master's level, in the fields involved by the studies, such policies have been successful. The average time to achieve a degree in the nineties fell by approximately 15 per cent, varying from about 10 percent to more than 20 percent, depending on the field of studies involved. Concerning doctorates, the information collected is less conclusive. While in some fields the average time to graduate did shorten, in others the changes are not noticeable. Nevertheless, the widely accepted sequential model, requiring that the student first finishes the master's level before being accepted at the doctoral studies, is a real barrier to reaching the international standards. Resistance to accept the path bypassing the master's level is very strong among Brazilian academics. One important source of this resistance is the assumed academic orientation of the master's programs in Brazil. In fact, if master degree had an academic nature what of its usefulness if it could be circumvented? After all, could it be true that most of the Brazilian public universities and the faculty there employed were wasting their time teaching and advising pupils in second best programs that cannot be bettered?

### **The prospects of master's studies in Brazil: academic orientation and market pressures**

As stated above, both master and doctoral programs in Brazil are supposed to be academically oriented. But the data gathered by follow-up studies show a very different picture. Most holders of master's degree are working outside academia, such as in firms (mostly private), in public administration or in professional offices. Of course, these figures change a lot, according to the field under consideration, as shown in Table 3, below. Masters in professionally oriented fields are heavily concentrated in jobs outside academia, in a proportion ranging from 60% (Business and Public Administration, Economics and Engineering) to 80% (Law and Medicine), while nearly 2/3 of those in more basic fields hold academic jobs (Chemistry, Physics and Sociology) (Velloso and Balbachevsky, 2002).

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<sup>7</sup> The three follow-up studies, carried out in the past five years, involved graduates from master and doctoral programs who were trained in Brazil and obtained their degrees since 1990, in fifteen fields: Agronomy, Biochemistry, Business and Public Administration, Chemistry, Civil Engineering, Electrical Engineering, Internal Medicine, Physics, Sociology, Economics, Dentistry, Geology, Mechanical Engineering, Law and Psychology.

**Table 3 - Brazilian Master Holders: Patterns of employment in academic and non-academic markets by field of knowledge**

<b>Disciplinary field of the program</b>	<b>Academic oriented market</b>	<b>Non-academic oriented market</b>
Agronomy (%)	51.3	48.7
Biotechnology (%)	45.4	54.6
Business Studies (%)	36.7	63.3
Chemistry (%)	60.2	39.8
Civil Engineering (%)	39.3	60.7
Dentistry (%)	32.7	67.3
Economy (%)	39.1	60.9
Electrical Engineering (%)	33.9	66.1
Geology (%)	34.6	65.4
Law Studies (%)	19.7	80.3
Mechanical Engineering (%)	32.4	67.6
Medicine (General Practice) (%)	22.0	78.0
Physics (%)	66.7	33.3
Psychology (%)	45.6	54.4
Sociology (%)	64.5	35.5

Source: Velloso, 2002b, tabulations made by the author.

Also, in spite of the sequential model, a significant number of master's holders are not envisaging to continue their studies. Working with the data collected with the follow-up studies, Weber found out that little more than one third of all interviewed did enter in a doctoral program after graduating at the master level (Weber, S. 2002)

The professional perspectives for the doctorate holders are much more homogeneous: more than 60% of the doctorate holders work in academic institutions, either in public universities or in public research institutions. The proportion of academic employment is not significantly diverse among doctors whether in hard or soft sciences or in fields professionally or academically oriented. While 90% of all doctors in Physics and Biochemistry are in the academia, 86 per cent of those in Electrical Engineering hold faculty positions or work at research institutes. While 60% of chemists and sociologists found employment in the academic marketplace, about 3/4 of economists, civil and mechanical engineers, and psychologists, have the same kind of jobs.

These findings are quite impressive, revealing remarkable proportions of academics among doctors graduated in professionally oriented fields, vis-à-vis the figures found for masters in similar fields. They raise important questions about changes that are taking place in the Brazilian post-graduate education. In fact, while the academic community and governmental agencies tend to view training at the master's level as an intermediate step

toward the doctorate, this is not how the students perceive it. For an important portion of them, this training is a final stage preparing for the job market outside the academy.

This situation poses important dilemmas for policy decision, as argued before. Acknowledging that the master's degrees are not, always, primarily academically oriented could imply a step forward drastically shortening the length of time spent by post graduate scholars in Brazil. Braga, using the data collected with the doctorate holders that were accepted in a doctoral program without a master degree, found out that they were 3 or 4 years younger than their colleagues when they finished their studies. (Braga, 2002)

But this trend states another set of questions: is the training received by our masters relevant to the needs of non-academic jobs? does the portfolio of academic fields covered by the Brazilian master's education fit the demands of the non-academic job-market? Is the schedule adopted by the master's programs adequate to the needs of part-time students? These issues pose a more difficult task: to recognise and incorporate the interests of another stakeholder until now ignored in all decisions made about post-graduate studies in Brazil: - the private firms. This is a great step that neither the Brazilian academic community (at least those employed at the public sector) nor the governmental agencies are prepared to take.

Up to the present, the sole answer to this challenge came from CAPES. In 1996, this agency proposed a diversification on master's level, offering the alternative of a new kind of master program – the so-called “professional master's degree”, oriented toward the demands of the non-academic job market. In CAPES proposal, this kind of program should include faculty from outside academy and should be self-sustaining – meaning that the public funds should be, in time, replaced by revenues from the tuition and fees that it would be allowed to charge. Nevertheless, this proposal summoned considerable resistance among academics. The main argument against such programs is that they would open up the public sector to market pressures, an anathema to be avoided at all costs. In 2001, after seven years from its regulation, only 64 professional master's programs had been accredited by CAPES, and 60% of them were ranked in the level 3 or 4 in the last evaluation.

Even for masters employed in the academic workplace, the survey highlighted another relevant tendency for the last years: while most of the masters graduated in early 1990s found employment in public universities, many of those graduated at the end of 1990s found placement at private institutions. This new pattern of employment is probably created by the

new requirements posed by the Education Act (Lei de Diretrizes e Bases da Educação) enacted in 1997, which demands at least 1/3 of any institution's faculty to hold a master or higher degree if it is to be officially accredited as an university. Being accredited as university entails not only prestige, but also a number of important prerogatives for the institution, such as the autonomy in creating new undergraduate and post-graduate programs. It is not surprising the new interest revealed by the private sector in employing post professionals. This tendency had been reinforced by the procedures adopted by the last government for evaluating the quality of undergraduate programs: in those evaluations, one important requisite taken into account by the Ministry of Education was the proportion of post-graduate holders among the faculty.

In Brazil, the private sector comprises a huge number of institutions and accounts for more than 60% of the enrolments in undergraduate level. These institutions are mostly teaching institutions with no real commitment to academic research, which master's studies are supposed to train for. Institutions at the private sector boast that they are very successful in meeting labor market demands for quick training. Thus, from their point of view the quality of teaching should be measured by the employability generated by the credentials they provide. As such, the professional profile they are in search of is not the one produced by the training offered by master's studies in Brazil. Currently this question is not being posed. Nevertheless one can expect that this new pattern of employment for the Brazilian masters' holders in Brazil will create new pressures sooner or later. Once again, it seems that the Brazilian academic community and agencies' officials are not willing to face such debate.

### **The international dimensions of post-graduate education**

Internationalisation of post-graduate education is a hot issue abroad but seldom heard of in Brazil. To most stakeholders, the Brazilian post-graduate system is perceived as a domestic alternative to post-graduate studies in foreign countries. In fact, since the mid-1990s, when the Brazilian doctoral programs were deemed in enough number to supply the domestic demand, S&T Agencies adopted a policy oriented to limit the number of fellowships for doctoral studies abroad, which resulted in a drastically reduced number of doctorate holders graduated in programs outside the country. A recent analysis shows that while among Brazilian scholars graduated until 1985 almost 50% had concluded their doctoral training abroad, among those graduated between 1986 to 1996 this proportion had declined to 30%.

For those graduated after 1996, only 20% hold international degrees (Guimarães, Lourenço, and Cosac 2001).

On the other hand, there is no policy oriented for the internationalisation of Brazilian domestic post-graduate layer. On the contrary, decisions taken until now go to the opposite direction. As an example, early last year (2002) the alleged country's best university – The University of São Paulo – issued new regulations under which Portuguese becomes the only and exclusive mandatory language for all post-graduate theses. Foreign candidates are required to prove their proficiency in Portuguese prior to being accepted as regular students and are supposed to present their dissertation written in the same language. This decision was taken in order to counteracts the tendency found in some programs to regard Spanish (along with English) as an acceptable language for the student's thesis<sup>8</sup>.

Of course, this situation doesn't mean that Brazil has an isolationist science policy. In fact, one could argue that even if Brazil did opt for training its doctors domestically, there is enough support for academics interested in doing post-doctorates abroad (at least for academics employed by the public sector) and for doctoral students going abroad for short internship periods<sup>9</sup>. What we are arguing is that policies related with the Brazilian post-graduate system seldom take into account its potential for internationalisation. Interchange with its counterparts abroad is deemed as a one-way flux; which greatly limits the international dimensions of Brazilian post-graduate studies, at least in those programs that are acknowledge as good by international standards.

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<sup>8</sup> One should not forget that Brazilian post-graduate system is the biggest in Latin-America and thus attracts students from others Latin American countries.

<sup>9</sup> If such experiences result in similar patterns of research internationalisation is an issue open to the debate. For arguments sustaining this conclusion see Meneghini (1995). For arguments in contrary, see Velho (2001) and Velloso (2002a).

## **The challenges from abroad**

Post-graduate education in Brazil have always been confined to the public sector<sup>10</sup>. Nevertheless, in recent years one can witness a growing interest in this kind of programs from private, for profit, institutions. These awareness has many sources: first, there are the pressures imposed by the 1997 Education Act. Second, there is the new job market value attached to the master degree, which creates new niches for the more enterprising institutions at the private sector.

Lacking experience and support for this enterprise, a number of these institutions turned their attention to the offers of partnership made by institutions abroad. The opportunities open by the new technologies applied in distance learning, and the interest of foreign entrepreneurial institutions in the Brazilian post-graduate market greatly facilitated the implementing of partnerships between private for-profit Brazilian institutions and their counterparts abroad. Since the end of the 1990s, an unknown number of such partnerships have been settled, most of them in soft fields like business studies.

On the overall, the official reaction to these initiatives has been very negative. The Ministry of Education stressed the dubious quality of such programs and expressed concerns about the unfair competition that could arise between these programs with international chancels and the ones offered by the public universities. On the CAPES perspective, this initiatives mine its monopoly over post-graduate evaluation and open important breaches in the quality control instruments that have been built in the past years. Accordingly, CAPES has resisted to accrediting these programs, imposing a number of requirements that virtually ends denying accreditation to almost all initiatives.

In spite of all resistance, the presence of programs of such nature has been growing in the Brazilian scenery. From the student's point of view, the credentials acquired in such programs seems to have a real market value. Even if not officially accredited, they are accepted by the job market. What is more, these programs appear to have important marketing effects for the Brazilian institutions. In fact, advertising partnerships with foreign institutions seems to be an important piece of publicity for those institutions. They add appeal and credit to the institution which is extended to its undergraduate programs.

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<sup>10</sup> The only important exception in this picture is the network of Pontifical Catholic Universities which started post-graduate education programs in the end of 1960s. These Universities, although privates, has always received important public support and has an institutional framework very similar to the public ones.

With such appeals and the lack of clear policies regarding the presence of the private sector in the post-graduate layer, it is not difficult to envisage the growth of the number of such initiatives in the near future. Ignoring their inconvenience by denying any legitimacy will not solve the problems posed by the increasing presence of these internationally shared programs.

### Concluding remarks

The 1990s were a decade of major changes and reforms in Brazil. Changes in the economy's framework had powerful impacts over the Brazilian higher education's demand figures. Public demand in Brazil is moving away from an elite-formation perspective and toward a general workforce qualification perspective. This decision implies an evaluation of the quality of undergraduate programs, the employability of their alumni, general science and mathematics literacy and the quality of teacher's training. By the time the post-graduate tier was organised in Brazil, the concerns of the Brazilian society about higher education were in open contrast to those predominating nowadays, as highlighted on Table 4, below.

**Table 4 - Brazil: changes in national concerns about higher education**

Concerns	1970's	1990's
University institutional autonomy	LOW	LOW
Control of public spending in HE	LOW	HIGH
Quality of undergraduate programs at public sector	LOW	HIGH
Quality of HE private sector (undergraduate)	LOW	HIGH
Quality of post-graduate courses	HIGH	HIGH
Diversity of science and technology human resources	HIGH	HIGH
General science and mathematics literacy	LOW	MEDIUM
Outputs of scientists	MEDIUM	HIGH
Elite formation and enlightenment	HIGH	LOW
University-productive sector interface	LOW	HIGH
Teacher education	MEDIUM	HIGH
Employability of alumni	LOW	MEDIUM
Faculty and alumni entrepreneurship	LOW	HIGH
Regional equity	HIGH	HIGH

Source: Balbachevsky, E.& Quinteiro, 2002, pp.91.

Brazilian higher education's ability to respond to the new demands rests, in a great deal, on the post-graduate system's ability to self-reform. It is in this layer that the new generation of academics will be formed. In order to partake of the new globalized knowledge economy, Brazil needs urgently to upgrade the quality in education at all levels. Post-graduate

education plays an important role in this process. In the format it operates in the present-day it will not fulfil the society's expectations for a more dynamic, diverse and inclusive education.

In the past, post-graduate education was deemed responsible for creating and reproducing the country's intellectual and scientific elite. In the present, while this task has not been discarded, new demands have been introduced. It is now supposed to bring forth a more polyvalent professional, one who could provide strong connections between academic research and the external world. New demands pose new requirements, among which the most important one is training a new, modern, generation of higher education teachers, that could operate the new learning tools that have been developed around the world.

Until now, these needs have been poorly met by short time training programs organised mostly by schools and universities in the private sector. They are the so-called "specialising" programs (cursos de especialização). We have few data about these programs. They are placed outside the mainstream post-graduate system and, as such, have no support, no scholarships and weak international ties.

As a tool for elite enlightenment, Brazilian post-graduate education is a very expensive, exclusive and self-indulging system. Requirements for granting public support to post-graduate programs include a high proportion of full-time teachers with a high performance in both research projects and publication while discarding less expensive and more diverse contribution from part-time teachers. Class schedules and tight deadlines for achieving degrees all but exclude non full-time students, which, in turn, requires a very extensive and expensive program of scholarships. Besides, while entitled to publicly funded scholarships, postgraduate students are not required to participate in teaching or researching assistance tasks or in any tasks outside their own education for that matter.

Its decision-making process only admits internal stakeholders: the academic community and the S&T governmental agencies. Not all the academy though. The whole post graduate layer in the private sector is poorly represented if at all. The remaining governmental agencies, the business community and the public at large have no part in the designing and evaluating the system's policies and achievements. Now these actors are knocking at the door. It is still early to predict whether or not or how far the door will open. But the quality of the system's response will shape the Brazilian post-graduate education's future.



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