



## **Gender in the Management of Brazilian Incubators**

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### **ABSTRACT**

The aim of this study is to examine the gender distribution in management posts of Brazilian incubators. It considers specifically the management functions in the incubators and the leadership positions in the national association to address the following topics: 1) the gender distribution in the job functions of incubators, 2) the characteristics of the incubator management, 3) the characteristics and performance of the incubators managed by women, and 4) the representative positions of the women working at the National Brazilian Association of Incubators. The principal result of this research, with regard to gender distribution in the job functions at the incubators, shows that women run few incubators (a mere 12.5% of the total). The characteristics of incubators run by women are that they are smaller, recently established and with fewer graduated companies. The investigation points to the need to increase transparency and accountability, from a gender perspective, of all social actors involved with incubators: universities, regional network incubators, incubators' councils and associations. It is suggested that these organizations should significantly improve the monitoring of practices towards a more equal distribution of gender. In particular, women should be positioned in all policy committees related to incubators, including the National Association's Board.

### **KEYWORDS**

Gender, incubators, science technology and innovation policy, Brazilian incubators



## **Gender in the Management of Brazilian Incubators**

### **INTRODUCTION**

The United Nations Millennium Declaration, signed in the year 2000 by the one hundred and ninety-one member states, sets out eight Millennium Development Goals (MDG). The objective of goal number three, 'to promote gender equality and empower women', is a demonstration of the worldwide effort to fulfill, by 2015, the commitment to improve the situation of humankind during this century, in particular that of women. The studies carried out in preparation for this MDG revealed that gender inequality starts at an early age and leaves women at a disadvantage for the rest of their lives. Recent studies show just how important it is to improve the situation of women, not only to achieve the aforementioned goal, but also to deal with poverty, hunger, health and education (UNDP, 2010).

In certain respects Brazilian women have achieved equality. For instance, women spend more time in education than men. Yet, compared to men, women still have less chance of obtaining employment, receive much lower remuneration for doing the same work and tend to occupy inferior posts. In 1998, 52.8% of Brazilian women were economically active, compared to 82% of men. In 2008, these proportions had changed to 57.6% and 80.5%, respectively. Meanwhile, in 2005, the proportion of men in formal jobs was 35%, against 26.7% of women. In 2008 the proportion of men in formal jobs had risen to 39.1%, while for women it was 29.5% (UNDP, 2010). Moreover, the participation of women in decision making positions is still low. In 2006, as a result of the preceding year's general elections, women had secured 11.6% of the seats in the state Legislative Assemblies, 8.7% in the Federal House of Representatives and 12.3% in the Brazilian Senate. In the 2010 elections, women won 13.6% of the Senate seats, 8.7% of those in the House of Representatives and 11.6% of the seats in the state Legislative Assemblies. Three Brazilian states were governed by women as a result of the former elections (Rio Grande do Sul, Maranhão and Pará), but from 2011 the number was down to just two: Maranhão and Rio Grande do Norte (UNDP, 2010). With regard to public policy, despite progress in Brazilian government programmes to achieve gender equality, the country lags behind the proposed UN indicators in regard to the MDG, which aim for: equal proportion of girls/boys in elementary and secondary education; similar ratio of female/male remuneration according to formal employment and education; proportional seats occupied by women and men in the municipal councils (UNDP, 2010).

Further information about the gender situation in Brazil derives from the Brazilian Institute for Quality and Productivity (Instituto Brasileiro da Qualidade e Produtividade, IBQP). In 2010 the country occupied the 10th world place in the entrepreneurship ranking. The survey showed that 17.5% of the Brazilian working-age population was involved in Total Early-Stage Entrepreneurial Activity (TEA) and that there were 21.1 million Brazilians engaged in entrepreneurial activities. In absolute terms, only China has more entrepreneurs than Brazil, with a TEA of 14.4% and a total of 131.7 million entrepreneurs. Among the early-stage entrepreneurs in Brazil, 50.7% were men and 49.3% women, showing gender

balance. However, among the male early-stage entrepreneurs, 2.8% seized an opportunity for every 1% who got into it out of necessity, while among the female early-stage entrepreneurs the ratio was 1.8% who took the opportunity for every 1.0% who responded to necessity. It would seem that most women who engage in entrepreneurial activities out of necessity do so because of the difficulty of breaking into the labour market: they become entrepreneurs because they cannot become employees.

Figure 1, taken from the IBQP 2010<sup>1</sup> survey, shows that there has been a significant increase in the participation of women in entrepreneurial activities. The rates for both men and women have risen sharply since 2008 and are now at a higher level than in any of the previous years.

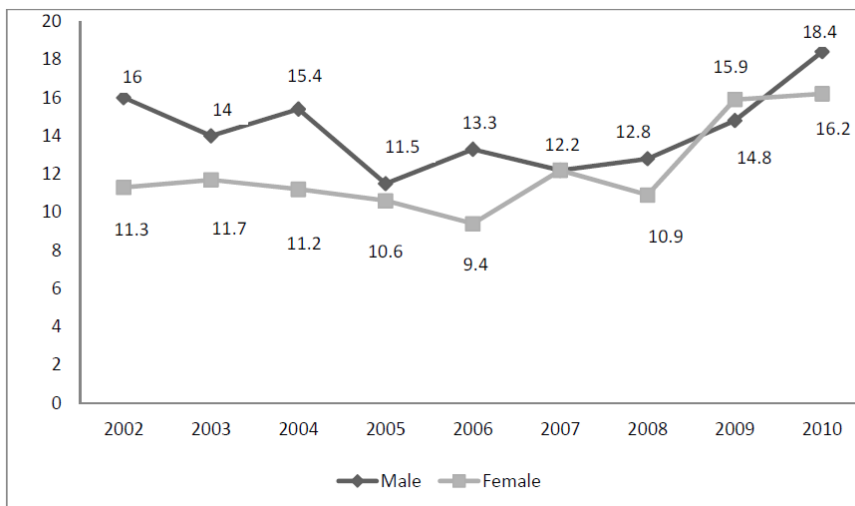


Figure 1: Percentage of Early-Stage Entrepreneurs in Brazil, by gender – 2010. Source: (IBQP, 2010)

It is specifically within the sphere of the gender dimension in new professions that are emerging in Brazil that this paper is located. Since the 1980s, a new kind of organization has evolved - the business incubator - and, simultaneously, a new profession - that of incubator manager.

Business incubation is a business support process that accelerates the successful development of start-up and fledgling companies by providing entrepreneurs with an array of targeted resources and services. A business incubator's main goal is to produce successful firms that will leave the program financially viable and freestanding. These incubator graduates have the potential to create jobs, revitalize neighborhoods, commercialize new technologies, and strengthen local and national economies.<sup>2</sup>

Brazil has a significant number of incubators. There are 440 incubators spread around different regions of the country (Almeida et al., 2011). Of that total, just 12.5% are run by women, but gender studies in this professional area are still

incipient, so there is a need for a deeper investigation about the characteristics of the gender dimension in incubators, including the national association responsible for their development, National Association of Entities Promoting Innovative Enterprise (Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores - ANPROTEC).<sup>3</sup>

Presently, there are no statistical data available that this study could utilize to show the current significance of incubators in Brazil. There are also no available data on female entrepreneurial participation in the companies under incubation.<sup>4</sup> In 2012, ANPROTEC disclosed the results of a survey presenting details of 384 associated incubators. Those incubators hosted 2,640 companies under incubation that provided 16,394 jobs and had a combined turnover of R\$ 533 million. A total of 2,509 companies, with a combined annual turnover of R\$ 4.1 billion and employing 29,205 people, had already graduated through these incubators (ANPROTEC, 2012).

The research that gave rise to our paper was based on the total of 440 incubators in Brazil (whether members or not of ANPROTEC), out of which 55 were directed by women, and 48 women managers were interviewed. On the other hand, the ANPROTEC database comprises only the 384 incubators that are linked to the institution. Another important detail is that, since the late 1980s, the Brazilian government has been supporting the incubators and their entrepreneurs through a variety of programmes aimed at specifically encouraging business incubation, as well as the implementation of numerous government programmes with a broader scope. Ever since that time, the incubators have been seen as important players in government development policy.

To contribute to further use of incubators in policy agendas, the principal aim of this study is to examine the gender distribution in the management posts in the Brazilian incubators. We will look specifically at the management functions in the incubators: management and/or coordination and the leadership positions in the national association, and consider the following topics: 1) the gender distribution in the job functions at the incubators, 2) the characteristics of the incubator management, 3) the characteristics and performance of the incubators managed by women, and 4) the representative positions of the women working at ANPROTEC.

### **STATE-OF-THE-ART**

To outline the current context in which our research is located, we discuss the importance of the incubators within the Brazilian Science, Technology and Innovation (ST&I) policy context and present a theoretical review of the field.

#### **Incubators within the Brazilian ST&I policy context**

The first incubators were founded in Brazil in the mid 1980s, a decade marked by major changes in the country's political and cultural life. The 1980s saw the return of democracy in Brazil, with direct elections for governors and mayors and increased pressures for direct presidential elections and a definitive end to the military dictatorship. These changes, in turn, created new social actors and marked the return of civil society to the governing sphere.

The science and technology policy initiated by the Brazilian government after the Second World War and maintained by the dictatorship was motivated by national security concerns and sought to achieve technological autonomy in sectors related to national defense by undertaking research investment and training in related areas. This meant that, for the first time, research activities were institutionalized in Brazilian Federal- and State-funded (and certain Catholic) universities as part of a large scale graduate school-based programme. The private sector was generally excluded from this endeavor and did not benefit from the technologies created by the public laboratories and universities. This meant that private industry generally had to acquire mature technologies from overseas sources (Coutinho and Ferraz, 1994).

At the end of the 1970s, Brazil experienced a severe economic crisis which combined deep external debt with a high rate of inflation (Dahlman and Frischtak, 1993). Macroeconomic instability, lack of resources to finance technological projects and changes in industrial policy led the government to abandon the technological autonomy project. During the final phase of the Brazilian military regime, the dictatorship was gradually phased out and, in 1982, state elections took place with the opposition winning a clear majority. Science and technology policy began to be redefined, in particular with regards to the traditional role played by the universities in private sector endeavors and in the development of action plans.

At the federal level, the National Council for Scientific and Technological Development (Conselho Nacional de Desenvolvimento Científico e Tecnológico, CNPq) established programmes focused on technology, seeking to protect the technology developed in national universities and research institutions, as well as identifying demands for technology transfer to the productive sector. In 1984, four months before the end of the military regime, the Technological Park Implementation Programme was created. Twelve projects were implemented in different States. An analysis of the Brazilian experience of technological parks by Santos (1987) and Pereira et al. (1987), and other more recent studies (Gomes, 1999) conclude that the programme was marked by political-institutional fragility which left it vulnerable to initiatives taken at all levels of government (municipal, state and federal), presenting modest results which in no way reached its declared objectives. It was also under-supported and under-funded.

In 1986, the military regime finally came to an end in Brazil, with the return of a full democracy. This new political environment made it possible for science and technology policies to be implemented based upon the triple helix model involving academia, industry and government, as had already begun to occur in incubators, even though other areas of the society had not yet adopted the same model.

The emergence of business incubators occurs within this context. The incubator proposal originally arose as an alternative to the installation of technology parks, as it needed fewer resources and could be relatively easy to set up by State governments. The first two incubators in Brazil were founded in 1986 - the first in São Carlos in the State of São Paulo at the initiative of a newly elected state

government (Souza and Garcia, 2000), and the second in the State of Santa Catarina by the Santa Catarina Federal University (UFSC) and the State's government (Cavagnari, 1987).

Incubators are generally presented as a new instrument for the transfer of technology. As such, the existing social and intellectual structure of the Brazilian academia, combined with the difficulties of implementing the military government's innovation policies during the economic crisis and civil society reorganizations of the early 1980s, opened the way for a new economic and social mission involving the training of individuals and organizations.

ANPROTEC was founded in 1987, bringing together representatives of incubators and technology parks. The policies to support incubators and technology-based companies changed significantly from the year 2000, with the launching of the Innovate Project, run by Funding Agency for Studies and Projects (FINEP). The project involves the coordination of various initiatives aiming to enable financial capitals to support technology-based companies during their early stages (FINEP, 2001). At the same time, a discussion got under way regarding a law on innovation, which was finally approved in 2004. Once the sector was regulated by the new law, various programmes were developed in support of technology-based companies, including incubated companies.

### **Theoretical Review**

The theoretical basis of this research work is grounded on two interconnected themes: i) incubators and the triple helix; and ii) the gender dimension in ST&I

### ***Incubators and the Triple Helix***

The incubators are organizations that provide an interface between institutions that promote science, technology and innovation, hence they can be studied in the light of the theoretical model named the triple helix, which postulates holistic interaction between three spheres - academia, industry and government - in the development of knowledge and innovation (Etzkowitz and Leydesdorff, 1998).

Thus, we can consider the triple helix model as an open concept and a pivotal idea, the construction of which can be observed three distinct periods. The first, from 1990s to 1998, saw connections between the triple helix and other models of innovation, such as the linear model and the national innovation system. The second, from 1998 to 2005, marks an advance in the use of the triple helix model as a tool of theoretical analysis of the innovation process, incorporating various local realities, such as Latin America and Asia. There was also the intensification of studies on the entrepreneurial university, the incubation of companies, research groups as 'quasi-firms', the regional impact, the technopolis and technology and science parks. In the third phase, from 2005 to 2014, the triple helix is seen as a model for analysis of the innovation process itself, and not as a form for observing the spaces where innovation occurs and interacts with other institutional areas (Almeida et al., 2011).

Since the triple helix model is considered to be an open concept, it has more recently been applied to topics such as sustainability (cf. Etzkowitz and Zhou,

2006), thereby becoming enriched in its development of scientific and technological progress, allowing an exchange with other theoretical approaches, be they in the economic or social science spheres. This conceptual evolution has also led to new approaches being put forward for consideration, including the gender issue, which was a topic of discussion, within the triple helix context, at the VII International Conference on University, Industry & Governmental Linkages, where several studies were presented to the panel on 'Knowledge Society Occupations – Transcending Gender Barriers'. At this same event (held in 2009, in Glasgow, Scotland), the theme 'Gender Issues in Science, Technology and Innovation' was also discussed in parallel sessions.

The interaction between university, industry and government was broadened by the introduction of a new concept – Triple Helix Spaces: Knowledge, Innovation and Consensus Spaces, which shows the process and mechanisms by which the institutional spheres interact and co-evolve over time (Etzkowitz and Ranga, 2010). The 'knowledge space' is primarily the realm of R&D in science and technology, located in universities, industry and government labs, as well as its functional equivalent in the arts (activities). The 'innovation space' is the venue for recombining elements of existing organizational models together with new concepts for organizational functioning in order to invent better ways to encourage and promote innovation. The 'consensus space' is at one and the same time, the physical space, convening platform and virtual framework that brings together the Triple Helix actors to brainstorm, discuss and evaluate proposals for advancement towards a knowledge-based regime (Etzkowitz and Ranga, 2010).

As affirmed by Etzkowitz (2002), the technological incubator is a consequence of the dual evolution of the university, as well as of the broadening of its mission and its focus on economic development. The worldwide technology transfer offices, set up by various governments in the 1970s, represent a means for academia to transfer knowledge to the government and the production sector. With the incubation process, the opposite occurs. Here the private sector (in the form of the incubated companies and cooperatives) establishes itself within the university environment.

The incubator is an example of the triple helix model and is considered a hybrid organization, internalizing the relations between the three spheres to encourage and create a space for interaction. The basic premise is that the development of the companies can be improved by organizing the incubators as an educational process. Furthermore, the technological incubator, like other organizations providing an interface between science and technology, is also one of the components of the space for innovation (Etzkowitz and Ranga, 2010).

Analysis of the Brazilian incubator movement includes a description of the activities of each of the components of the triple helix in support of the incubators (Etzkowitz et al., 2005). The first incubators set up during the 1980s, in response to a weak social coalition, subsequently gained the support of a wide range of interests and institutions. Over time, ANPROTEC took on a life of its own, as a brand new organization with its own purpose and goals. Addressing the Brazilian incubator

movement through the concept of Triple Helix Spaces: the Knowledge, Innovation and Consensus Spaces allows one to perceive the room for knowledge created mainly by the actions of the universities, the room for innovation provided by the incubators themselves, and the room for consensus offered by ANPROTEC.

The triple helix model is used in our research as a useful framework because it also allows for a gender discussion. According to Vehviläinen et al. (2010), in the innovation space, the organizations for the interface between science, technology and innovation, together with the incubators, women's participation has influence on the economic and social development of the regions where the management units have been set up. We explore the gender dimension of management of incubators in detail below.

### ***Gender Dimension in ST&I***

In countries where the issue of gender equality has been discussed for some time, various initiatives are being critically analyzed. Some examples are found in the European Union, other European countries and in North America.

In the European Union, Rees (2001) examines the position of women in science in academe. This study is based on data collected for the European Technology Assessment Network (ETAN) Report, 'Science Policies in the European Union: promoting excellence through mainstreaming gender equality'. The data indicate that irrespective of discipline, female undergraduates in every country leave scientific careers in disproportionate numbers at every stage; this being particularly high after the postdoctoral level. Rees also analyses three approaches to developing gender equality: equal treatment, positive action and gender mainstreaming, and shows how the position of women in science might be improved by the application of these three approaches by universities and research institutes. One of the conclusions is that women scientists will maintain that science is science; they do not do science differently because they are women. Meanwhile, women scientists are also leaving their disciplines in disproportionate numbers: this constitutes a problem for those women leaving unwillingly or who may want to return, but also for the development of scientific excellence. It is clear that many leading universities and research institutes in Europe have been left behind by the modernization of employment practices in other sectors. Mainstreaming gender equality is advocated by the ETAN group, both to address the social justice ambitions of the EU, but also in the name of fostering excellence in science through the more effective use of human resources. As an example, the article evidences the result of a specific policy in Finland that dispensed with associate and assistant grades and promoted all incumbents to full professorships. This act caused an overnight increase of women full professors from 13% to 18%.

In Finland, Vehviläinen (2010) analysed gender equality in the context of interface organizations between science, technology and innovation, focusing on gendered work practices in four science parks, operating in the fields of biotechnology, engineering and social innovations (i.e. referring to service innovations and organizational process innovations). The decision about the three-field choice was that the gender patterns in science parks resemble those of the nearest academic



field. The result pointed out that the science park focused on engineering was the most male dominated work place, while the science parks in biotechnology and social innovations had a more balanced gender division.

In a Norwegian study about advertisement campaigns aimed at changing the image of computer science to attracting more female students, Lagensen (2007) notes that four different inclusion strategies were used to recruit women to computer science: achieving a critical mass, educational reform, redefining the gendered symbolism of computer science and changing the content of the discipline. The author points out that it is important to consider the features that may work to exclude women, but also the qualities that influence their inclusion. This point of view could provide a different image about the relationship between gender and technoscience than the one that arises from the predominant focus on exclusion. The analysis of the campaigns reveals that computer science had to change as a discipline to recruit women students. Also, efforts to redefine computer science as symbolically 'feminine' have not been particularly successful as a recruitment strategy. The increase in the number of women students was achieved by the use of a quota to recruit women, combined with efforts that directly change manifest appearances of gender, such as providing more role models with the objective to make them feel welcome and appreciated.

The study about women in science in the USA by Etzkowitz and Leydesdorff (2000) considers that women face special gender related barriers to entry and also to success in scientific careers. This situation persists, despite recent advances resulting from affirmative actions, the effects of shortage in some periods, the economic competitiveness and generational changes. The reason lies in the organization and culture of academic science that deters many women of high scientific ability. The policy intervention suggested, in order to increase the number of women in science includes: 1) stimulating the creation of critical mass of women faculty members in academic science and engineering departments with the aim of changing academic culture to diminish the barriers to women in the future, and 2) revising the image of high-level careers in science and engineering for women from anomalous to 'normal'. The authors discuss that women can succeed in the scientific workplace by successfully managing 'social capital', because those networks and relationships are important for professional support and new ideas.

Some studies address the insertion of women in relation to the creation of new professions. This may come about mainly as a result of: 1) new technology, 2) demographic changes caused by ageing populations, immigration and improved educational levels, 3) business trends, and 4) changes in consumer needs and preferences; or a combination of more than one of these factors. One can affirm that a new function has been created when it is clear that none of the professions used in the official classifications can adequately define the new activities being performed. Frequently, a new profession will appear as a result of the joint efforts of professionals from different fields (Crosby, 2002).

According to Etzkowitz and Ranga (2010), there are two factors that influence perceptions of the gender dimension in research and development, invention and

innovation. The first of these is the fact that individual innovators are not the subject of studies on innovation and research. The second is the socially constructed, yet implicit notion, that women are less innovative than men, associated with the social perception that technology is more frequently linked to men than to women. Personal characteristics also affect this view, since men are considered to be more competitive, while the idea of consensus building is associated with women. A concern with consensus building in the innovation space is part of the triple helix approach, seen as room for consensus, which makes it possible to analyse the gender dimension.

Figure 2 below, shows the gender distribution of Brazilian researchers in various scientific fields. One can see that, in 2012, out of the 100,740 doctorates registered in the Curriculum Lattes database (the central government academic data collection), 46,702, or 46.4%, were women. The distribution of this group within the eight fields of knowledge recorded by the Brazilian government is as follows:

- agrarian sciences – 8.10%
- biological sciences – 15.89%
- health sciences – 17.90%
- mathematical and earth sciences – 9.78%
- social sciences – 19.42%
- applied social sciences – 8.59%
- engineering – 4.88%
- linguistics, literature and the arts – 8.19%
- information not provided – 7.25%.

With regard to Masters degrees, women represented 53.9% of the total. The distribution of this group within the eight fields of knowledge recorded by the Brazilian government is:

- agrarian sciences – 5.11%
- biological sciences – 9.50%
- health sciences – 19.11%
- mathematical and earth sciences – 7.27%
- social sciences – 21.31%
- applied social sciences – 14.96%
- engineering – 2.71%
- linguistics, literature and the arts – 8.56%
- information not provided – 11.47%
- 

These data reveal the small number of qualified women, with Masters degrees or PhDs, who have careers in fields of knowledge that are considered to be high-tech.

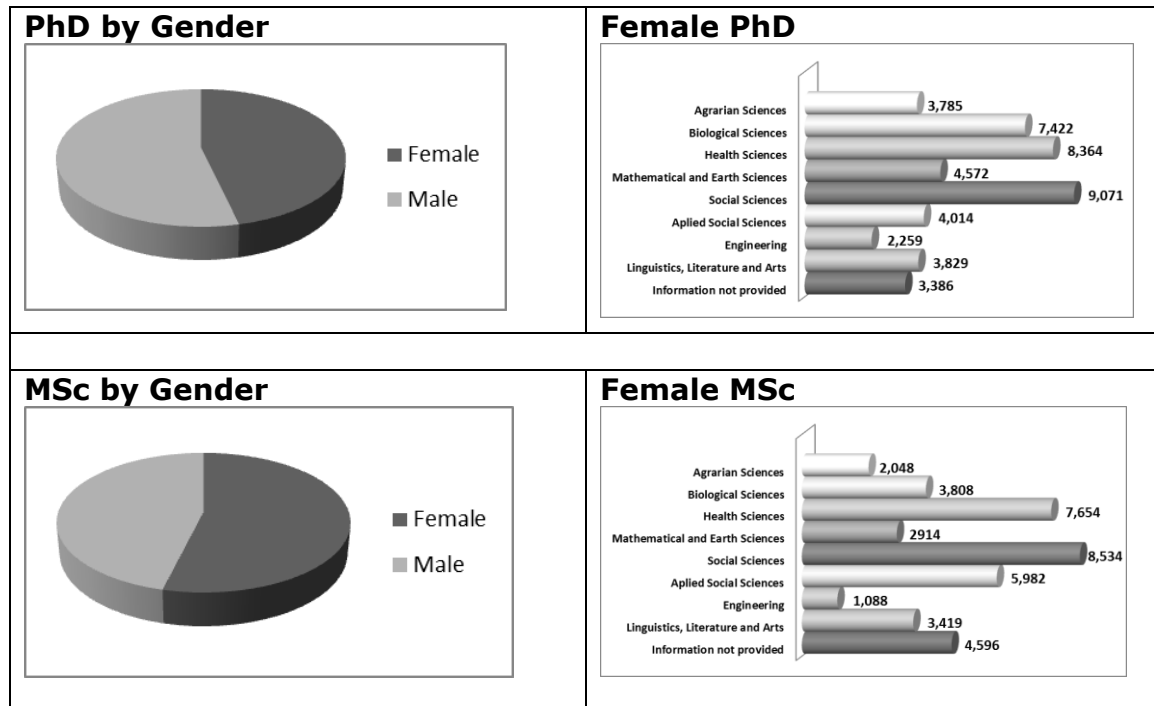


Figure 2 - Researchers' distribution by gender and field

Source: National Council for Scientific & Technological Development/Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPQ) - Lattes Panel, available on <http://estatico.cnpq.br/painelLattes/sexofaixaetaria/> accessed on February 25<sup>th</sup>, 2013.

According to CNPq data, the number of grants for productive research awarded annually by this agency through a selection process that takes into consideration the experience and scientific production of the candidates, among other factors, shows that men are the main recipients. Women have received just 34% of the grants. In certain fields, such as electrical engineering, the proportion of women applying for grants represents a mere 5% of the total number of applicants.<sup>5</sup>

A previous study into the professional participation of women in Brazilian incubators was carried out by ANPROTEC in 2008. On that occasion, the institution sent a questionnaire to all the associated incubators and technology parks, with the recommendation that they should be answered spontaneously by the women on the staff of these institutions and sent to an e-mail address set up especially for the survey. A total of seventy nine questionnaires answered by women working at the incubators were considered valid. Of this total, the largest proportion of those responding (46.8%) were in coordination or management positions, followed by those in other administrative posts (13.9%). The responses revealed the level of injustice and discrimination experienced by women working at the incubators, with 45% stating that they had heard about or suffered age or gender discrimination in their work. The interviewees also affirmed that women occupied few management positions in technological fields and that the decision making about financial matters was mostly the responsibility of men (ANPROTEC, 2008).<sup>6</sup>

The gender exclusion existing in Brazilian society is reproduced in the environment of the incubators. In Brazil, women represent more than half of the population and the number of voters, have a higher average education level and account for almost 50% of the country's economically active population. However, they occupy less than 20% of the higher level posts in the hierarchy of the Brazilian Congress, municipal and state governments, senior executive departments, the judiciary, trade unions and universities. In the business sector, they occupy roughly 20% of the leadership positions. Cultural factors are among the principal causes of this male-female disparity: the culture of the sexual division of labour, the reluctance to share domestic and family tasks and gender discrimination, among other factors, limit the independence and full participation of women in the decision making spheres (Hausmann et al., 2010).

Nevertheless, over the last twelve years, an increase has been noted in the proportion of women occupying the most senior posts in companies. In 1996/97, women occupied 10.4% of the presidential or CEO posts, but this had more than doubled, to 21.4%, by 2008/09. The same survey also revealed the growing presence of women in all other leadership positions, including vice-president and executive, management, supervision, coordination and other positions of responsibility. The lowest positions in the leadership hierarchy are the only ones where women are in the majority however, occupying a little over 55% of the posts. As one moves up the hierarchy, the female presence is less in evidence. It is more common for women to reach an executive position in a company when it has fewer than fifty employees. In such cases, women hold 27.5% of the presidential posts. But in companies with over 1,500 employees, only 12.6% of the highest positions are held by women. One of the factors that have enabled women to attain leadership positions is their superior educational level, which increases their chances of getting into the labour market and achieving success through better qualifications.<sup>7</sup>

However, the successful penetration of women in economic activities is also due to the historical inequality in pay levels. In Brazil, female employees earn 30% less than men, on average, and the higher the educational and remuneration levels, the greater is the inequality, which may also help explain the increased presence of women at the head of Brazilian companies.<sup>8</sup>

## **METHODOLOGY**

The main question discussed in this paper is: *Which are the characteristics of the incubators run by women in Brazil?* The methodology for the investigation was developed in two phases. The first phase used a quantitative analysis to identify the number of Brazilian incubators. This survey began in 2009, when the research group collected information on the incubators from a variety of sources, including the list of members of ANPROTEC and UNITRABALHO,<sup>9</sup> besides regional and state incubators networks, as well as over the internet and by telephone. The result was a number of 440 incubators (Almeida et al., 2011). The second phase had both quantitative and qualitative components. The former identified the gender distribution in management posts at the Brazilian incubators: from the total of 440 incubators, 55 incubators were managed by women, representing 12.5% of the

total population of incubators managers in Brazil. The qualitative component addressed women managers. A phone interview was conducted with 48 female managers, during October and November 2010. The women managers of the incubators provided information about the field of their professional qualifications, their age, the year they started working at the incubator, the year they started working as a manager/coordinator of the incubator, difficulties they have faced, remuneration level, the possibility of professional advancement, what professional post they imagine they might attain, and their level of satisfaction with the activities they perform.

## FINDINGS AND INTERPRETATION

### Gender Distribution according to Job Functions at the Incubators

Data on the proportion of women in management in the incubators and at ANPROTEC confirms that there is gender segregation in this area, as out of the total of 440 incubators surveyed in Brazil, only 12.5% are run by women. With regard to the possibility of career advancement, analysing the job functions in the incubation area, only 48% of the administrators interviewed confirmed the possibility of their obtaining other professional opportunities. The other 52% communicated the belief that they had already gone as far as was possible within the profession, stating that there was no prospect of further advancement. This result may be linked to the lack of a structured career program within the universities and other institutions hosting ST&I incubators.

For the women managing incubators who were among the 48% mentioned above, Figure 3 shows the positions they are aiming for, bearing in mind that 65% of these women were unable to respond to the question in the survey about their chances of securing professional advancement, thereby further confirming the precarious position they find themselves in.

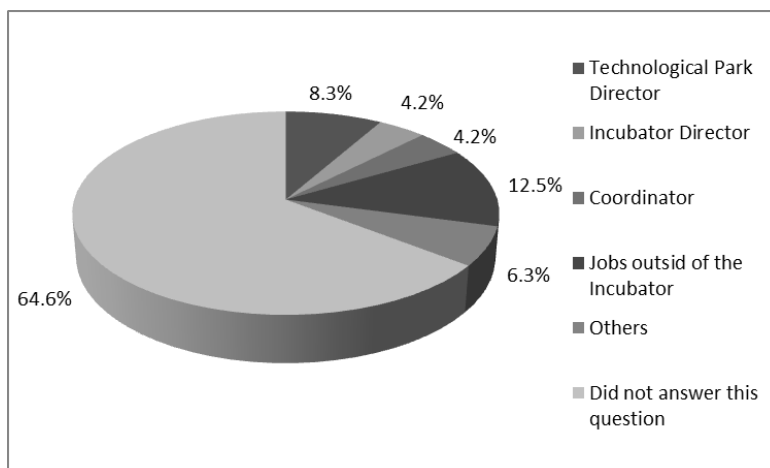


Figure 3 – Positions that women incubator managers aspire to. Source: The Authors.

Out of the other 35%, 16% women managers were looking at positions at the ST&I interface (incubators and technology parks), while the other 19% see their promotion opportunities in positions outside this profession (6% want to be university professors and 13% want to occupy unspecified posts).

The pay range for women managing incubators is diverse: 39% earn the equivalent of up to R\$ 40,630 (£12,506) a year; 38% earn between R\$ 40,630 (£12,506) and R\$ 81,260 (£ 25,012) a year; while 23% earn more than R\$ 81,260 (£25,012) a year.

### Characteristics of Brazilian Incubators Run By Women

With regard to the characteristics of the incubators in Brazil that are run by women, taking into consideration the number of organizations incubated and in pre-incubation, one can see that the smaller incubators tend to be run by women. These are the incubators that have fewer organizations incubated and in pre-incubation. Figure 4 shows the data: 50% of the incubators run by women have between 0 and 5 organizations incubated.

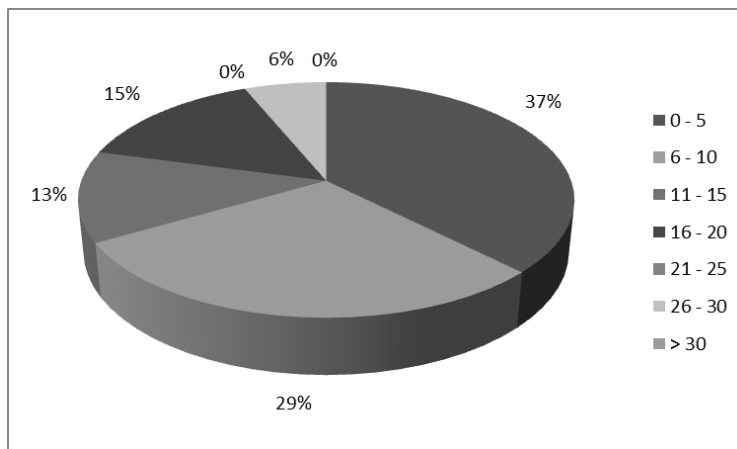


Figure 4 – Number of incubated organization. Source: The Authors.

At the other extreme, in incubators that have more than thirty organizations incubated, there are no women within their management (see Table 1).

Number of Incubated firms	%
0 – 5	37.50%
6 – 10	29.17%
11 – 15	12.50%
16 – 20	14.58%
21 – 25	0.00%
26 – 30	6.25%
> 30	0.00%

Table 1 – Proportion of women managers per number of incubated firms Source: The Authors.

Consequently, these incubators also have a lower rate of graduated organizations, with Figure 5 showing that 50% have graduated up to 5 organizations. Graduated companies or graduated cooperatives are startup businesses that leave the incubator. Each business incubator establishes graduation policies that include

specific criteria relative to its mission and its ability to provide continued value to the client. Many incubation programmes set time limits on client services, or in other cases a company should be required to graduate when it has progressed beyond the incubator's capacity to provide sufficient value or the client ceases to utilize the services provided by the incubator.

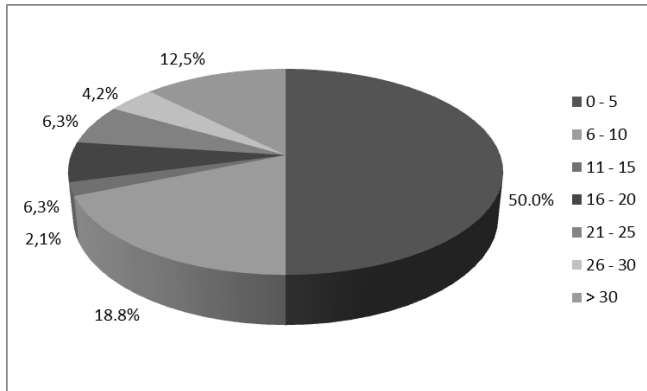


Figure 5 – Number of graduated organizations. Source: The Authors.

Another feature is that the majority of the incubators managed by women have only recently been established, for as Figure 6 shows, 40% were set up between 2001 and 2005 and another 19% between 2006 and 2010.

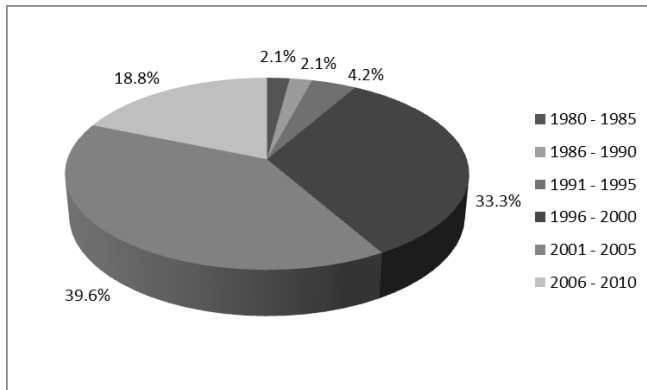


Figure 6 – Incubators date of establishment. Source: The Authors.

Figure 7 shows the main difficulties facing the women managing incubators in the daily performance of their duties. Analysis of the difficulties encountered suggests that these are apparently correlated to the environment in which the incubators are inserted, since the reasons cited were: lack of financial resources (32%), lack of human resources (6%), and lack of knowledge about the area of incubation (15%).

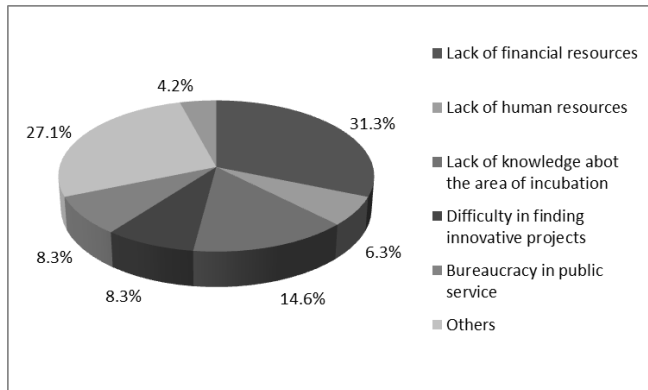


Figure 7 - Main difficulties for managing incubators. Source: The Authors.

Two other aspects are here highly relevant. First the incubators managed by women are smaller, recently established with fewer graduated companies and meaning that these incubators generally get less financial support from agencies. Second, it is possible to point out the perspectives on gender differences since the difficulties cited are potentially aggravated by the fact that the managers are women and have to face the stereotypes of resource gatekeepers.

Our results presented in Figures 3, 4 and 5 lead to a comprehensive and critical analysis of gender issues in Brazilian incubators. To summarize, the characteristics of the incubators run by women are:

- They tend to be small – 50% of the incubators run by women have between 0 and 5 organizations incubated;
- They include fewer graduated companies – 50% have graduated up to 5 organizations;
- They are recently established – 40% were set up between 2001 and 2005 and another 19% between 2006 and 2010.

Discrimination against female managers of incubators can be inferred by analysing the intersectionality regarding age, education, length of service and job satisfaction. In the interviews carried out for this study, the following information was obtained:

- women run 12.5% of the country's incubators (55 incubators);
- out of the 55 incubators run by women, 28 (just over 50% of those run by women) are among the smallest (in terms of the number of companies incubated) and have been going on for the shortest time (less than 5 years). In other words, incubators managed by women are the ones that have generated the least impressive results, in terms of the number of companies that have graduated, number of jobs created and revenue earned, which are the main indicators used by ANPROTEC and in government programmes for assessing the performance of the incubators.
- the majority of the women managers interviewed were in the most productive age group (30 to 50 years old), had completed higher education, had been working in the sector for over 10 years and derived considerable personal satisfaction from their work.



Looking at the positive factors mentioned above, it is clear that job opportunities for women in strategic positions are limited in terms of quantity (only 12.5% run an incubator) and to a small niche market (smaller incubators with fewer companies). In other words, women tend to be involved more in the early stages of the incubator life cycle.

The first ever research on incubators in Brazil was carried out in the period 1994-1995 and showed that in the early days of the incubation movement, when there were only 14 incubators in the entire country, 50% of the nascent incubators were run by female scientists who, contrary to the traditional notion, became excellent administrators and imposed 'incubator organization' within the university context.

At that time, the incubators had little influence and were viewed with distrust within academia. They were frequently regarded as intruders, since they came into the university environment as organizations devoted to the business sector. The gulf between the scientific and business sectors was very clear and most of the university board members were opposed to the setting up of incubators on the campus. A debt is therefore owed to those female scientists who had the courage to assume the leadership mantle and take responsibility for managing those entities and developing projects that brought together researchers from different areas. Because they were an organizational innovation, in terms of their creation strategies and work processes, those early incubators did not confer status upon their managers (BAETA, 1999).

In Brazil there is a lack of data collection and literature on this topic.

### Characteristics of Female Managers of Brazilian Incubators

Among the women managing incubators, it can be seen from Figure 8 that 2% have completed post-doctoral qualifications, 6% have a doctorate, 21% have a master's degree, 42% have graduated and 29% have attained some other educational level.

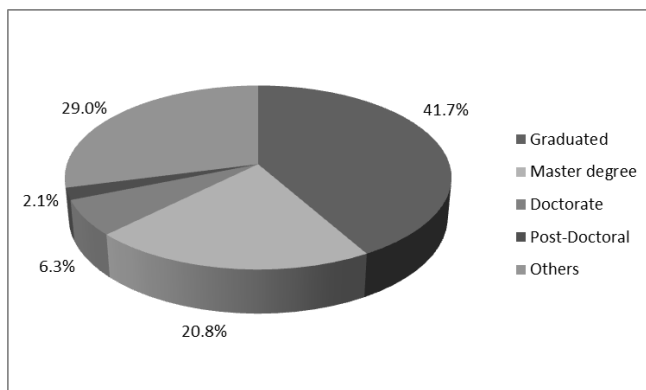


Figure 8 - Educational level. Source: The Authors.

With regard to professional training, Figure 9 shows that 31% were trained in Business Administration, 9% in Accountancy, 6% in Law, 2% in the Social Sciences, 9% in Social Communication, 4% in Engineering, 4% in Pharmacy, 4% in

Psychology and 31% in other areas. They are professionals from different backgrounds and possessing diverse skills, working in a variety of production sectors, that take on the task of managing the incubators, including direction and coordination.

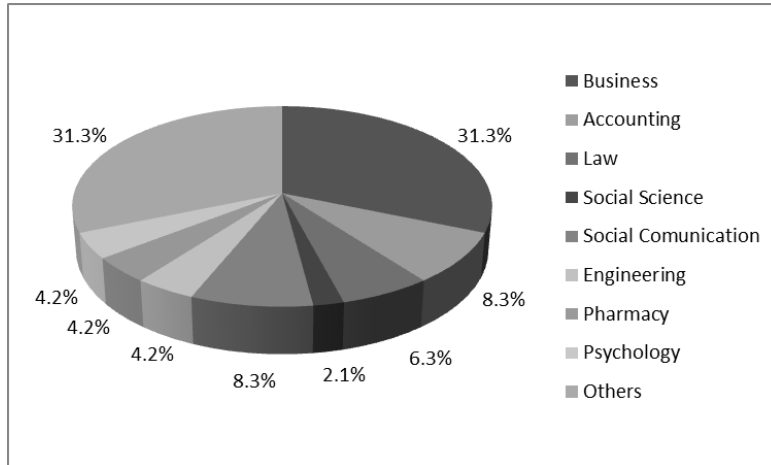


Figure 9 - Professional training. Source: The Authors.

According to Crosby (2002), new occupations are created when employers need workers to perform tasks that have never been done before. These needs can bring about the emergence of a new occupation, if the changes are sufficiently dramatic and different to the original professional background. In such a context, one might create a new occupation by grouping professionals differently. It is from this perspective that Achatz et al. (2010: 82) analyse the work of men and women in organizations at the university-company interface (technology transfer offices) in Germany, considering: 'evoked pictures of the staff as a "motley crew" - teams of diverse people, coming from various disciplines with different backgrounds and experiences'. The information in Figure 9 indicates that this same professional dynamic is also in play in the Brazilian incubators managed by women.

Another characteristic of women managers is their age range, which is distributed as follows: 20-30 years old – 21%; between 31 and 40 – 33%; between 41 and 50 – 33%; and over 50 – 13%.

The entry of women into the administration of the incubators surveyed saw 17% join in the 1990s, while 83% of the women interviewed joined after the year 2000, meaning that most of them have been doing this job for less than ten years. Another detail that should be emphasized is that most of the women managers have occupied the post for some time, thus demonstrating job stability, which is directly related to the satisfaction to be found in the work. On the other hand, these data emphasize that gender inequality in incubator management has been a regular feature of the incubator movement in Brazil.

### Female Involvement at ANPROTEC

ANPROTEC embraces incubators of various kinds (technological, traditional, social, cooperative, mixed and cultural). Since it was founded, the entity has been run by

a board, elected for a two-year mandate by the representatives of its members at an AGM. And since the first board was elected, in 1987, the association has had eleven groups of directors. A woman has never been president of the association and only in 2007, eighteen years after it was founded, was a woman, Prof Gisa Helena Melo Bassalo,<sup>10</sup> elected to its board. During the two years in which the professor served on the board, the president of ANPROTEC was Prof Guilherme Ary Plonski.<sup>11</sup> He was re-elected for the following term (2009 – 2011) and the female participation was enhanced by the election of Francilene Procópio Garcia<sup>12</sup> to the vice-presidency, while Professor Bassalo remained on the board.

Given the small proportions of women in technological research, in the engineering fields and in decision making circles, an expected general pattern could be identified across the ST&I interface organizations, just like incubators: only a few women are in either high management or leadership positions, just like the situation at ANPROTEC.

## **CONCLUSIONS**

According to the data obtained in this 2011 study, it was confirmed that Brazil has a significant number of incubators, bearing in mind that, according to the NBIA (National Business Incubator Association),<sup>13</sup> in October 2012 there were over 1,250 incubators in the United States, up from only 12 in 1980. The NBIA also estimates that there are about 7,000 business incubators worldwide. The incubation model has been adapted to meet a variety of needs, from fostering the commercialization of university technology, through increasing employment in economically distressed communities, to serving as an investment vehicle.

In this article gender equality in Brazilian incubators has been explored through a quantitative and qualitative analysis based on empirical data collected by organizational documents and interviews with the incubators' women managers.

Previous studies about Brazilian incubators have been conducted, however none of them aimed to explain the gender dimension in this way. This paper contributes to filling this gap because the focus has been on how the gender distribution occurs in the management activities in incubators and also the characteristics and the performance of the incubators run by women.

To analyze the position of women in the management of incubators it was necessary to paint a picture of the gendered nature of Brazilian society. In the economic context, it demonstrates that women already spend more time in education than men, yet still have less chance of obtaining employment; they also receive much lower remuneration than men for doing the same work and tend to occupy inferior posts, having less formal jobs.

In the broader social context, the participation of women in decision making circles is minor in the state Legislative Assemblies, in the Federal House of Representatives and in the Brazilian Senate. Only three Brazilian states were governed by women from a total of 27 federative units. The election of the first Brazilian women president has symbolic value for gender change since she is

concerned to raise the representation of women in the higher positions of the public sector. Nevertheless, the gender inequality in Brazil is clear in the ST&I area, specifically in the management of the incubators, as our study has identified. In order to change this situation and increase gender equality, it is necessary to promote women in the ST&I sector. Our comprehensive and critical analysis of this leads us to conclude that in this field there is discriminatingly selected evidence.

Based on this analysis, policies to encourage the greater participation of women in the administration of the incubators and in areas of technology transfer could be introduced, in order to reduce the gender inequality amongst those working in this field. Increasing the number of professionals working in ST&I has been the objective of Brazilian public policies. Various call notices for engineering have been issued, with a view to stimulating the interest of students in careers in this field. However, there has been no complementary approach to attract female participants to such careers. It has been noted that there has been a broadening of the understanding and of the efforts to develop public policies based on the consensus space that innovation is important to the Brazilian economy (passing of the Innovation Law, the setting up of funding for grants, the development of programmes for selecting innovative business projects to receive government resources, etc). However, the gender dimension has still not been addressed, either for consolidated professions or for newly emerging professions, where there is still male domination. The gender equality dimension must be included within the Brazilian public policy.

The first policy recommendation based on our findings is to improve women's under representation by promoting gender awareness and fairness: a need to increase transparency and accountability of all social actors involved in incubators (universities, regional networks incubators, incubators' councils and ANPROTEC). Practically all these organizations should significantly improve their gender monitoring. The second one to include women in all policy committees related to incubators, including the ANPROTEC Board in order that male committees, who define and deciding on incubators, are not accepted as legitimate. Even if the field of interface organizations (as incubators) is heavily male dominated there are women involved in all levels and most areas.

The scenario described in this paper is linked with a traditional relationship between women and men in Brazilian society. It is moving slowly now, but it is far from an adequate or even an acceptable position. For this reason the recommendations could be important to raise the gender equality in the country. Future investigations on gender are needed in Brazil, to undertake a systematic analysis on the dynamics of gendering in interface organizations, such as incubators.

## ENDNOTES

<sup>1</sup> The authors of the 2010 IBQP report state that 'although the data used in this survey have been collected by the GEM consortium, the analyses and interpretations are the sole responsibility of the authors. Permission to reproduce sections of the GEM 2010 Global Report, included in this report, has kindly been granted by the copyright holders. GEM is an international consortium and this report was produced using data from the 59 countries in the survey's 2010 cycle.'

<sup>2</sup> Available at [http://www.nbia.org/resource\\_library/what\\_is/index.php](http://www.nbia.org/resource_library/what_is/index.php), accessed on November, 29, 2013.

<sup>3</sup> Data accessed on May 23, 2010.

<sup>4</sup> In the most recent survey, published in 2003 by ANPROTEC, the information provided was in relation to the men and women working in incubators linked to the institution, and not to female entrepreneurs. The data shown addressed: the number of partners in each company, their age, educational level and qualification field. There was no information about the gender of the entrepreneurs. The survey determined that there were 207 incubators, covering a total of 1,500 incubated companies, where 28% of the positions were occupied by women, out of a total of 8,600 jobs. So the questions about gender were related to the people working in incubators linked to that organization. And since these data were obtained more than 10 years ago, it is not possible to assess whether that also reflected the proportion of male and female entrepreneurs within the incubated companies.

<sup>5</sup> Available at <http://memoria.cnpq.br/saladeimprensa/noticias/2010/0202.htm>, accessed on February, 23th, 2013.

<sup>6</sup> See note 2.

<sup>7</sup> Survey carried out by Catho On Line and released on October 15, 2009.

<sup>8</sup> Idem.

<sup>9</sup> Available at <http://www.unitrabalho.org.br/spip.php?article6>, accessed on February, 23th, 2013.

<sup>10</sup> A professor at the Faculty of Architecture and Urbanism of the Federal University of Para and the manager of that university's Technological Incubator.

<sup>11</sup> A researcher in the field of ST&I, with a research project entitled 'Issues of technology and society', including issues of gender and technology, technology and migration and technology and social inclusion. She has also had the following articles published in relation to this subject, that demonstrate her concern over the gender issue: 1) Gender Science and Technology in Brazil, co-authored by Plonski R.G.S. (Minerva, vol. 39, 217-238, 2001); 2) Mulher define novos rumos na

sociedade da informação/ Woman sets new directions in the information society, Folha de São Paulo newspaper, March 3, 2002; 3) Mulheres são Minoria/Women are minority, Estado de São Paulo newspaper, April 18, 1998; 4) O papel das Mulheres na C&T/The Women's role in S&T, Inova Gestão & Tecnologia, São Paulo, 2001).

<sup>12</sup> Professor at the Federal University of Campina Grande and head of the Paraíba Technology Park.

<sup>13</sup> [http://www.nbia.org/resource\\_library/faq/#3](http://www.nbia.org/resource_library/faq/#3) accessed on October 22, 2013.

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