

## **Gender Dimension in Brazilian Incubators**

Sub-theme: The gender dimension in science and technology, innovation, technology transfer and entrepreneurship, venture capital

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4) Keywords: triple helix; incubators; gender dimension; science, technology and innovation; innovation habitat

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### **Abstract**

Brazil has a substantial number of incubators. There are a total of 400 distributed throughout all the regions of the country (ANPROTEC, 2009). There are various kinds of incubator: technological, traditional, mixed cooperatives, and cultural. The movement for the creation and development of incubators in Brazil has been cited internationally, in the works of Lalkaka and Bishop (1996), Scaramuzzi (2002), Etzkowitz (2002, 2003), Feldman (2002), Almeida (2004), Almeida, M., Coelho, G. and Terra, B. (2008), Almeida, M., Terra, B. and Hernandez, M.P.M.P. (2011) and Etzkowitz, Mello and Almeida (2005). Several other studies address various different aspects of this experience. One of the facets that has been little explored to date is in regard to gender. The aim of this work is to supplement this area of study, looking at the characteristics of gender distribution among incubator management and at the national association of incubators.

### **1. Introduction**

The UN Millennium Declaration, signed in the year 2000 by the 191 (one hundred and ninety-one) member states, sets out 8 (eight) "Millennium Development Goals (MDG)". The objective of goal number 3 (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, and particularly that of women (UNDP, 2010).

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 research shows just how important it is to improve the situation for women, not only to achieve the aforementioned goal, but also to attain various other objectives, notably those relating to poverty, hunger, health and education (UNDP, 2010).

Certain aspects of the Brazilian scenario indicate that women already spend more time in education than men, yet still have less chance of obtaining employment, receive much lower remuneration than men for doing the same work and tend to occupy inferior posts. In 1998, 52.8% of Brazilian women were considered to be 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 jobs where their work papers were signed was 35%, against 26.7% of women. And in 2008 the proportion of men whose working papers were signed had risen to 39.1%, while for women it was 29.5%.

Moreover, the participation of women in decision making circles 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, they 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 states), but from 2011 the number was down to just two: Maranhão and Rio Grande do Norte, (UNDP, 2010).

In countries where the gender issue has been discussed for some time, various policies are being formulated, such as in the USA (Vehviläinen, 2010 apud Lagensen, 2003; Rees, 2001; Etzkowitz et al., 2000), Sweden (Fältholm and Källhammer, 2009 apud Fältholm et al, 2010), and Finland (Vehviläinen, 2010 apud Vehviläinen and Brunila, 2007). With regard to public policy in Brazil, despite progress in government programs aimed at achieving the aforementioned goal number 3, it can be seen that these do not yet reflect, as a whole, the proposed UN indicators related to the MDG, which address: proportion of girls/boys in elementary and secondary education; ratio of female/male remuneration according to formal employment and education; proportion of seats occupied by women in the municipal councils.

As regards the disclosure of the results of research in relation to the gender dimension in science, this appears in Brazilian works that discuss, for example, the question of male domination in the scientific field and seek to show how this domination functions (Carvalho, 2006; Leta, 2003; Cruz, 2007). Several works have also been published in Brazil that address the gender dimension in the context of female entrepreneurs and women in technological innovation, carrying out research in biotechnology and information technology and setting up businesses, from the point of view of both management and entrepreneurship (Jonathan, 2003; Silva, 2006; Machado et al, 1999 e 2003; Ferreira, 2000).

It is specifically within the sphere of the gender dimension in new professions that are emerging within Brazil that this paper is inserted, since we have already witnessed, during the 1980s, the appearance of a new kind of organization - the business incubator - and, simultaneously, a new profession – the incubator manager.

Brazil has a significant number of incubators. There are 440 spread around different parts of the country (Almeida et al, 2011). Of that total, just 14% are run by women, but gender studies in this

professional area are still incipient, so there is a need for deeper study into the characteristics of the gender dimension in the incubators and extending also into the national association, ANPROTEC (National Association of Entities Promoting Innovative Enterprise).

Hence, the aim of this study is to conduct a critical analysis of the gender dimension in the Brazilian incubators. It will involve looking specifically at the management functions in the incubators (management) and/or coordination and the leadership positions in the national association; observing the following topics: 1) gender distribution in the job functions at the incubators; 2) characteristics of the incubator management; 3) characteristics of the incubators run by women; and 4) women working at ANPROTEC.

The state of the art of this research involves the incubators concepts inside the Brazilian S,T & I policy context and the theoretical review that considers 2 (two) interconnected themes, they are: i) incubators and triple helix and ii) gender dimension in S,T & I.

The methodology used was composed by a theoretical review in the first step, followed by an exploratory research in 55 (fifty five) incubators, managed by women, in the second step. At this last step an interview was applied to this 55 (fifty five) managers and 48 (forty eight) answered the question.

Finally, the results were presented in a topic named "Findings and Interpretation" followed by the Conclusions, the Policy Implications and Directions for Further Research and the References.

## **2. State-of-the-art**

### **2.1 Incubators within the Brazilian S&T&I Policy Context**

The first incubators were founded in Brazil in the mid-'80s, 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 public (and certain Catholic) universities as part of a large-scale graduate school-based program. 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 to the government's abandonment of 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. The university community, supporting the return of democracy but hobbled by the military government, participated in the formulation of political platforms during the state elections. At the same time, science and technology policy began to be redefined, in particular with regards to the traditional role played by the universities, the private sector endeavors and in the development of action plans.

At the federal level, CNPq established programs which 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 "Programa de Implantação de Parques de Tecnologia" (Technological Park Implementation Program) was created. Several projects, specifically 12 (twelve) were implemented in different states. An analysis of the Brazilian experience of technological parks by Santos (1987) and Pereira et al. (1987), as well as other more recent studies (Gomes, 1999) conclude that the program was marked by political-institutional fragility which left it vulnerable to initiatives taken at all levels of governments (municipal, state and federal), resulting in 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. With the reorganization of civil society on democratic lines, groups and individuals could now express themselves freely without fear of persecution. This led to the foundation of a new set of political forces. This new political environment made it possible for science and technology policies to be implemented based upon the triple helix model, as had already begun to occur in incubators, even though other areas of the society had not yet adopted the same model.

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 UFSC (Universidade Federal de Santa Catarina – Federal University of Santa Catarina) and the state government of Santa Catarina, (Cavagnari, 1987).

Incubators are generally presented as a new instrument for technology transfer. 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 on supporting incubators and technology-based companies changed significantly as from the year 2000, with the launching of the Innovate Project, run by FINEP (Funding Agency for Studies and Projects). This project involves the coordinating of various initiatives for the purpose of enabling the capital market to function, supporting the 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 programs were developed in support of technology-based companies, including incubated companies.

## 2.2. Theoretical Review

The theoretical basis of this research work is grounded in 2 (two) interconnected themes: i) incubators and the triple helix; and ii) the gender dimension in S&T&I

### 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 the three spheres - academia, industry and the 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, in the construction of which can be observed three distinct periods. The first, covering the 90s, up to 1998, beyond the definition of the model, saw reflection on the connection 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, saw 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-industry", the regional impact, the technopolis and technology and science parks. In the third phase, from 2005 up till now, 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 its interaction with other institutional areas (Almeida et al., 2008).

Since the triple helix model is considered to be an open concept, it has more recently been applied to topics such as sustainability, in 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, in the United Kingdom - UK<sup>1</sup>, in parallel sessions, the theme Gender Issues in Science, Technology and Innovation was also presented.

The interaction between university, company and government was also broadened by the introduction of a new concept - “Triple Helix Spaces”: Knowledge, Innovation and Consensus Spaces, which show the process and mechanisms by which the institutional spheres interact and co-evolve over time (Etzkowitz and Ranga, 2010).

In the regional developing space, depending upon the dynamics of the relationship between academia, industry and the government, a variable series of configuration may occur in the formation of the triple helix system. Triple Helix I – or the laissez-faire model – presumes an institutional separation between the three spheres, with well-defined borders. Triple Helix II – also known as the etatistic model – occurs in those cases where the State also encompasses enterprise and the university. Finally, Triple Helix III presumes a superposition of the three spheres with the creation of hybrid institutions or networks. These three configurations generate distinct kinds of interaction and insertion between the component institutional spheres and these, in turn, generate significant theoretical and practical implications (Etzkowitz and Leydesdorff, 2000; Etzkowitz, 2008). This approach presumes interaction over a determinate period of time (a synchronic interaction). At the same time, the concept of “Triple Helix Spaces”: Knowledge, Innovation and Consensus Spaces” allows analysis of the transition of the triple helix configurations over time, when analyzing the interactions (a diachronic interaction) (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

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<sup>1</sup> Available at <http://www.triple-helix-7.org/>.

actors to brainstorm, discuss and evaluate proposals for advancement towards a knowledge-based regime” (Etzkowitz and Ranga, 2010).

Supplementary definitions of the Triple Helix System embrace its components, relationships and functions. The components include the institutional spheres of University, Industry and Government, with a number of actors related to each sphere; relationships encompass a complex mix of links associated, on the one hand, with collaboration and conflict moderation and, on the other, with substitution; and functions (attributes) are defined in terms of a novel concept that we call the “Triple Helix Spaces”: the Knowledge, Innovation and Consensus Spaces (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 technology transfer offices, set up 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, with the private sector, in the form of the incubated companies and cooperatives, setting up within the university environment.

The incubator is an example of the triple helix model of university - company - government relations, and is considered a hybrid organization, internalizing the relations between the three spheres and encouraging and creating a space for interaction. The basic premise of the incubators is that the development of the companies can be improved by organizing it 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). Within the structures of the triple helix model, company or cooperative incubators are seen as hybrid organizations which internalize the relationship between academia, enterprise and the state, stimulating the creation of an interactive space which connects these spheres (Etzkowitz, 2008). Moreover, the technology incubator, as well as other interface organizations between science and technology is also a component of the innovation space (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 were set up during the 1980s, in response to a weak social coalition, and 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.

## ii) Gender Dimension in S&T&I

In the innovation space, recommended in the theoretical concept of the triple helix, one finds the organizations for the interface between science, technology and innovation, together with the incubators, and the role of women in the development of these organizational structures has an influence on the economic and social development of the regions where the management units have been set up (Vehviläinen et al, 2010).

In other countries, such as Finland and Sweden, the organizations providing the interface between science and technology are considered typical examples of the female workplace environment, as verified by Vehviläinen, 2009 apud Vehviläinen et al, 2010.

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 aging populations, immigration and improved educational levels; 3) business trends; 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).

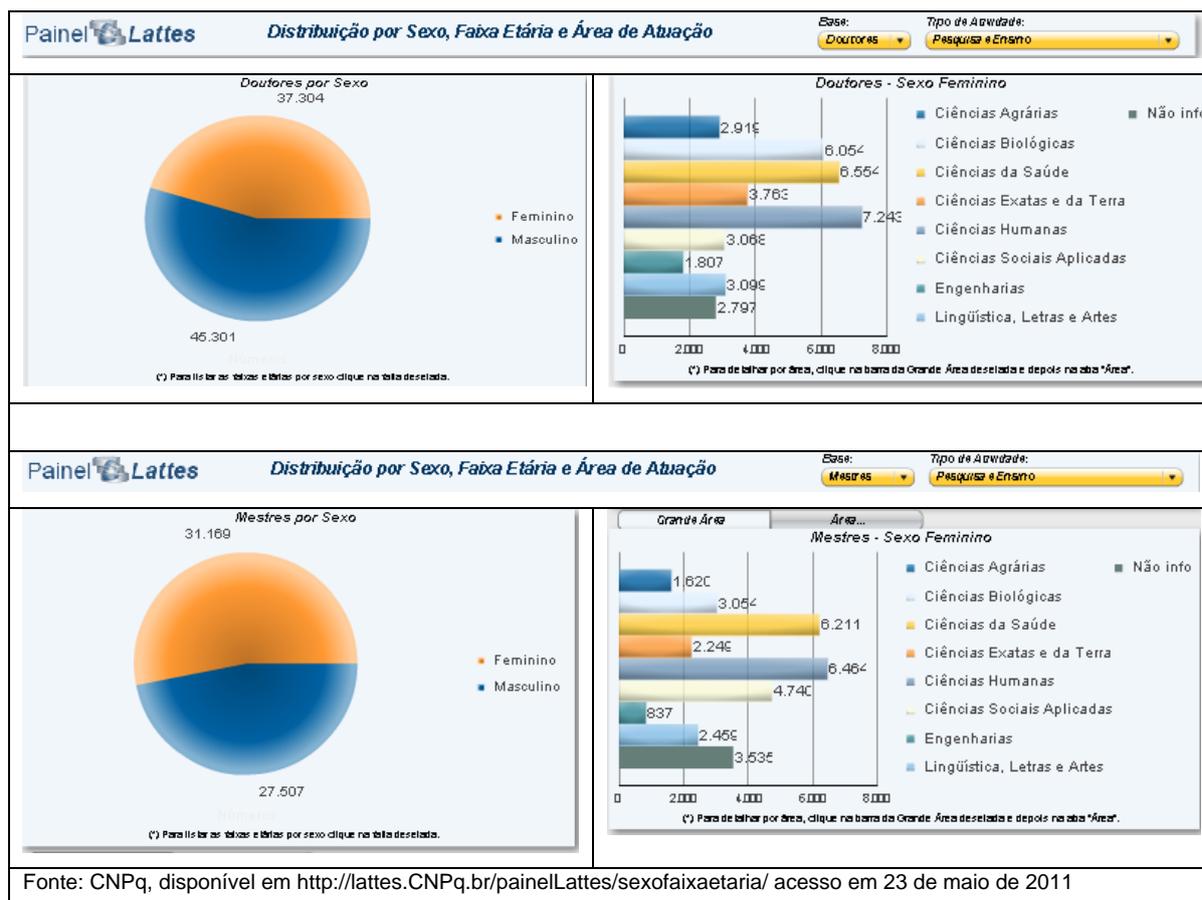
According to Etzkowitz and Ranga (2010), there are two factors that influence perceptions of the gender dimension in research and development, invention and innovation. The first of these is the fact that individual innovators are not the subject of studies on innovation and research. The second is the 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 analyze the gender dimension.

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>2</sup>

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<sup>2</sup> <http://www.CNPq.br/saladeimprensa/noticias/2010/0202.htm>, accessed on 23<sup>rd</sup> May, 2011.

**Figure 1 - Researchers' distribution amongst gender, age and field**



The figures above, from that same Brazilian agency, show the gender distribution of Brazilian researchers in the various scientific fields. One can see that, in 2010, of the 82,605 doctorates registered in the “Currículo Lattes”<sup>3</sup> database<sup>4</sup>, fully 37,304, or 45.15%, are women. The distribution of this group within the eight fields of knowledge recorded by the Brazilian government is as follows: agrarian sciences – 7.83%; biological sciences – 16.23%; health sciences – 17.57%; mathematical and earth sciences – 10.09%; social sciences – 19.42%; applied social sciences – 8.23%; engineering – 4.85%; linguistics, literature and the arts – 8.29%; and information not provided – 7.49%.

With regard to master's degrees, women represented 53.12% of the total. The distribution of this group within the eight fields of knowledge recorded by the Brazilian government is as follows: agrarian sciences – 5.19%; biological sciences – 9.79%; health sciences – 19.92%; mathematical and earth sciences – 7.21%; social sciences – 20.73%; applied social sciences – 15.20%; engineering – 2.68%; linguistics, literature and the arts – 7.88%; and information not provided –

<sup>3</sup> It is a platform where all Brazilian researchers include their curricula.

<sup>4</sup> The article “Let’s make science metrics more scientific”, published in the magazine “Nature” on 25<sup>th</sup> March, 2010, contains text by Julia Lane, director of the program “The Science of Science and Innovation Policy”, of the US National Science Foundation, with a positive mention of the CNPq curricular system.

11.34%. These data reveal the small number of qualified women, with master's degrees or doctorates, who have careers in fields of knowledge that are considered to be high-tech.

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 79 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 prejudice regarding 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 regarding financial matters was mostly the responsibility of men (ANPROTEC, 2008).

The gender segregation existing in Brazilian society is reproduced in the environment of the incubators. In Brazil, women represent more than half the population and 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 labor, the reluctance to share domestic and family tasks and gender discrimination, among other factors, are still limiting 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 just 10.39% of the presidential or CEO posts, but this had more than doubled, to 21.43%, by 2008/09. The same survey also revealed the growing presence of women in all the 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 50 employees. In such cases, women hold 27.47% of the presidential posts. But in companies with over 1,500 employees, only 12.60% 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 labor market and achieving success through better qualifications. 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 the inequality, so this may also help explain the increased presence of women at the head of Brazilian companies<sup>5</sup>.

Company incubators first appeared in Brazil in the 1980s, creating new business opportunities for entrepreneurs, as well as a new profession - that of incubator management. In these cases, the functions performed by these professionals differed from those of their original professions.

### **3. Methodology**

The efforts of the authors to identify the number of Brazilian incubators yielded a total of 440 (Almeida et al, 2011). The survey began in 2009, when the research group collected information on the incubators<sup>6</sup> from a variety of sources, including the list of members of ANPROTEC and Unitrabalho<sup>7</sup> and regional and state incubators networks, as well as over the internet and by telephone. This survey yielded a list of 440 incubators of many different kinds: technological, traditional, cultural, cooperative, social and sectorial.

The methodology used in the second phase comprised a theoretical review, in the first stage, followed by exploratory research in 55 (fifty-five) incubators managed by women, in the second stage. In this last stage, during October and November 2010, a phone interview was conducted with these fifty five managers, with 48 (forty-eight) female managers responding to the questions.

The 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.

### **4. Findings and Interpretation**

#### **4.1 Gender Distribution among the 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 too. Of the 440 incubators surveyed, only 14% are run by women.

With regard to the possibility of career advancement, analyzing 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

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<sup>5</sup> Survey carried out by Catho On Line and released on October 15, 2009.

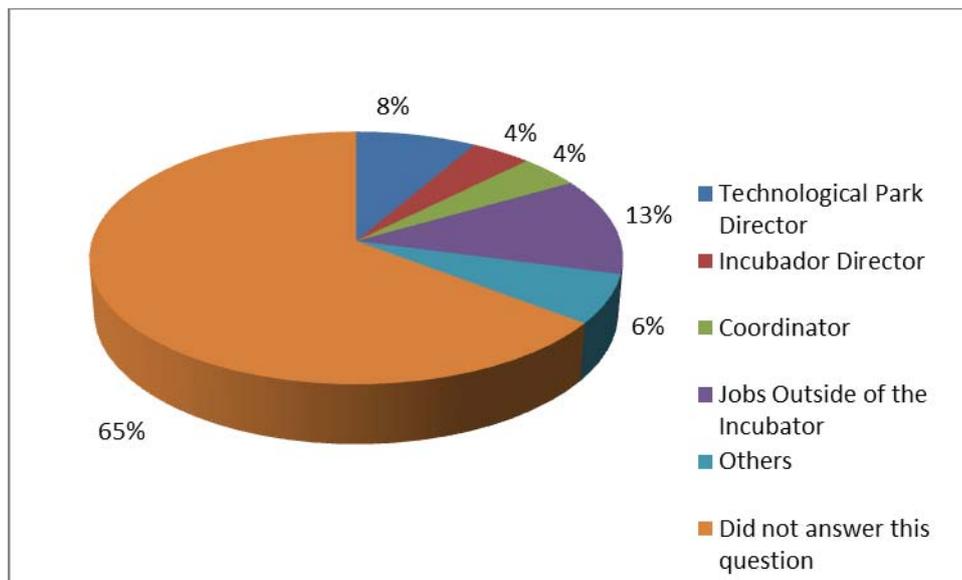
<sup>6</sup> This research led to the book chapter Theory and Practice of Triple Helix Model in Developing Countries: Issues and Challenges, by Almeida, M., Terra, B. and Hernandez, M.P.M.P. 2011. The Incubator Movement: a Comparative Analysis of Brazil and Mexico. In: Mohammed Saad and Girma Zadiw. (Org.). London: Routledge, 2011, p. 176-189.

<sup>7</sup> Published at [www.unitrabalho.org.br/spip.php?article6](http://www.unitrabalho.org.br/spip.php?article6) , accessed on May 23, 2010.

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 S&T&I incubators.

For the women managing incubators who were among the 48% mentioned above, the following figure shows the positions they are aiming for, bearing in mind that 65% of these women were unable to respond regarding their chances of securing professional advancement, thereby further confirming the accuracy of the above comment.

**Figure 2 – Positions that women manager incubators aspire for**



Source: The Authors.

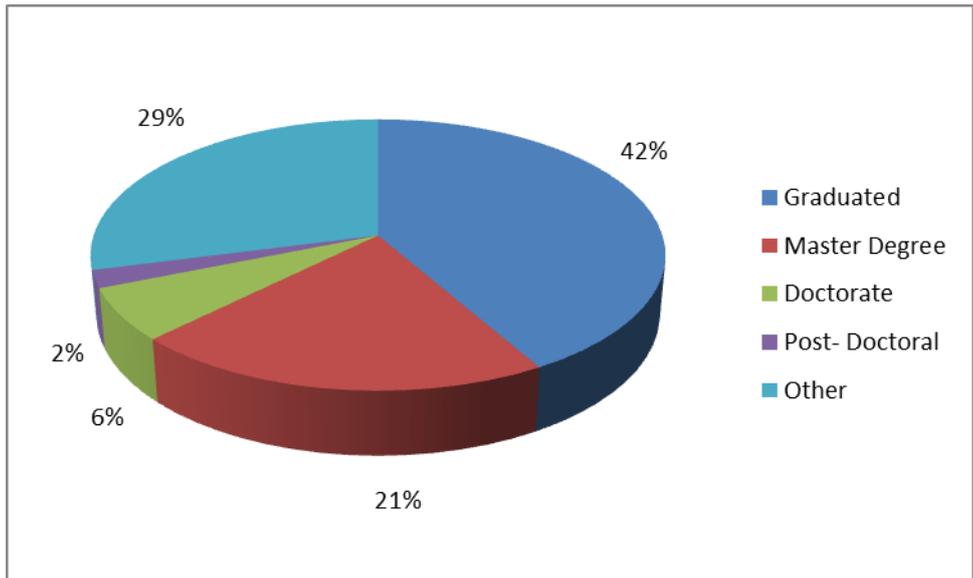
Of the other 35%, 16% were looking at positions at the S&T&I interface (incubators and technology parks), while the other 19% see their promotion opportunities in positions outside this profession (6% want to be university professors and 13% want to occupy unspecified posts).

The pay range for women managing incubators is diverse: 39% earn up to US\$ 20,000 a year; 38% earn between US\$ 20,000 and US\$ 40,000 a year; while 23% earn more than US\$ 40,000 a year.

#### **4.2 Characteristics of Female Managers of Brazilian Incubators**

Among the women managing incubators, it can be seen from Figure 2 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.

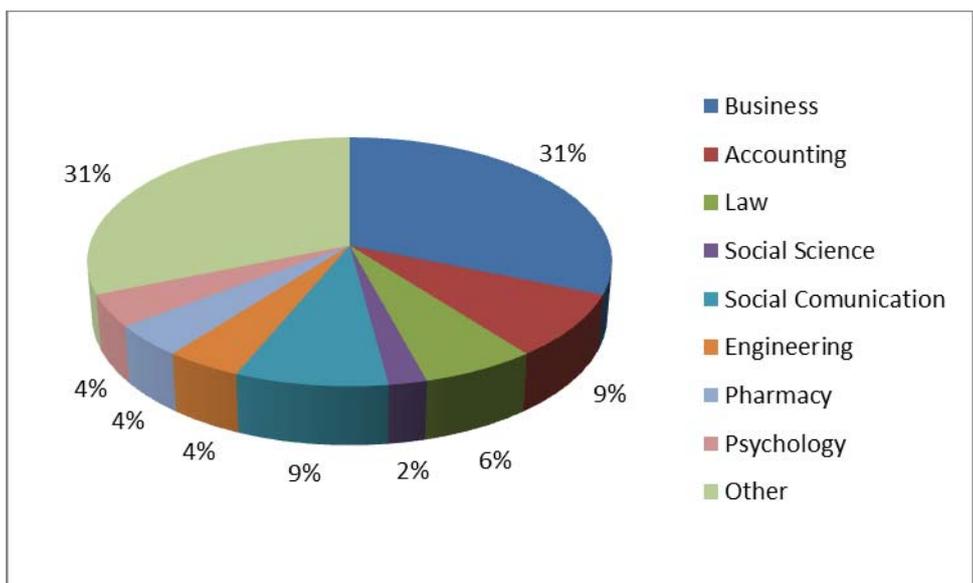
**Figure 3 - Educational level**



Source: The Authors.

With regard to professional training, Figure 4 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 the directing and coordinating.

**Figure 4 - 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

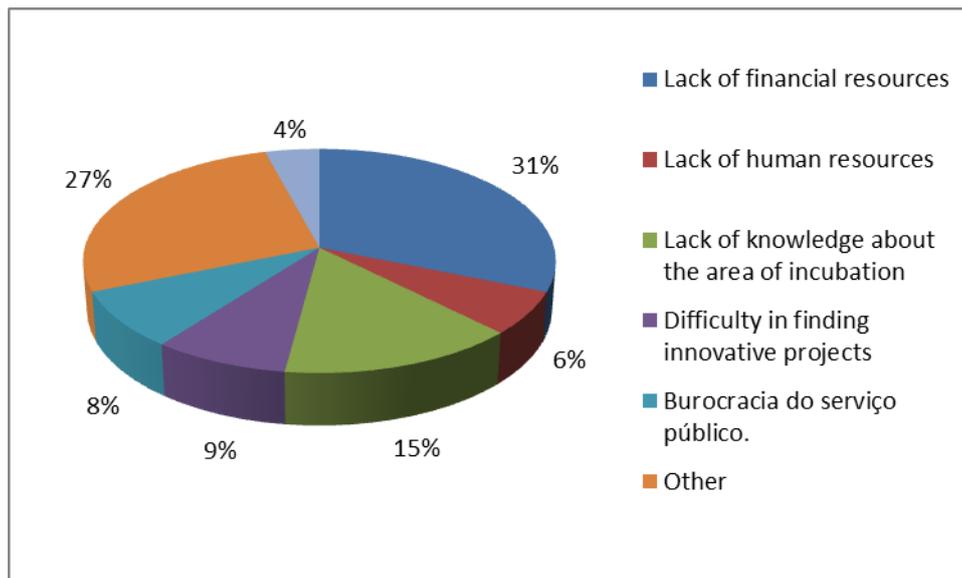
new occupation, if the changes are sufficiently dramatic and different to the original professional background. In such a context, one might see the grouping of professionals with different backgrounds to create a new occupation. It is from this perspective that Achatz et al (2010) analyze the work of women in organizations at the university-company interface in Germany. The information in Figure 4 indicates that this same professional dynamic is also in play in the Brazilian incubators.

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.

Figure 5, below, shows the main difficulties facing the women managing incubators in the daily performance of their duties. Analysis of the difficulties encountered suggests that it is apparently correlated to the environment in which the incubators are inserted, rather than being a gender characteristic, 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 5 - Main difficulties**

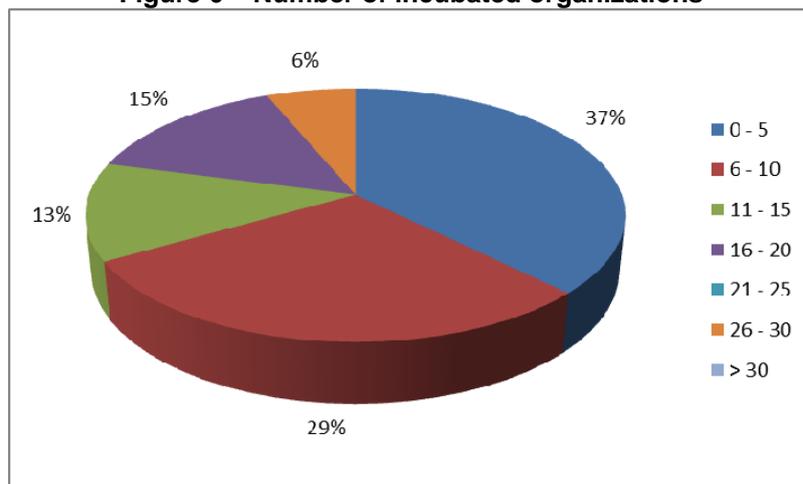


Source: The Authors.

### 4.3 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, in other words, the ones that have fewer organizations incubated and in pre-incubation. Figure 6 shows the data: 50% of the incubators run by women have between 0 and 5 organizations incubated, while at the other extreme, at incubators with more than 30 organizations incubated, one can see that there are no women within their management.

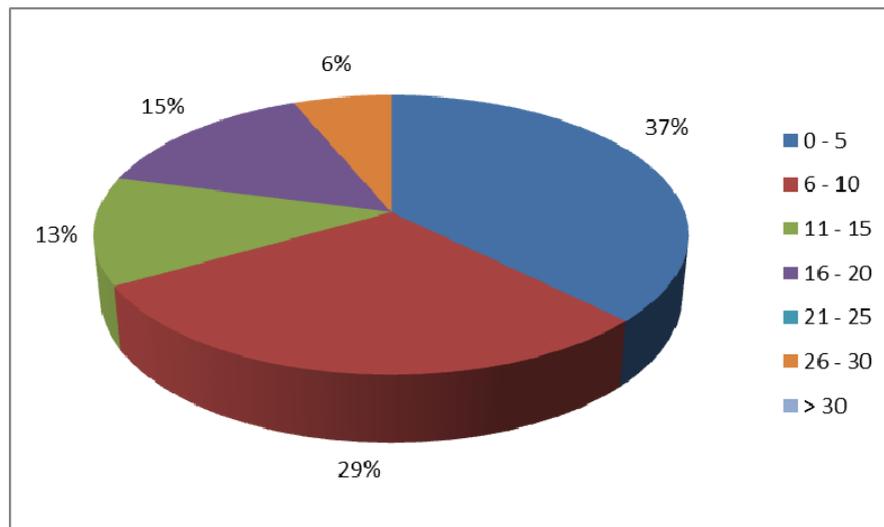
**Figure 6 – Number of incubated organizations**



Source: The Authors.

Consequently, these incubators also have a lower rate of graduated organizations, with Figure 7 showing that 50% have graduated up to 5 organizations.

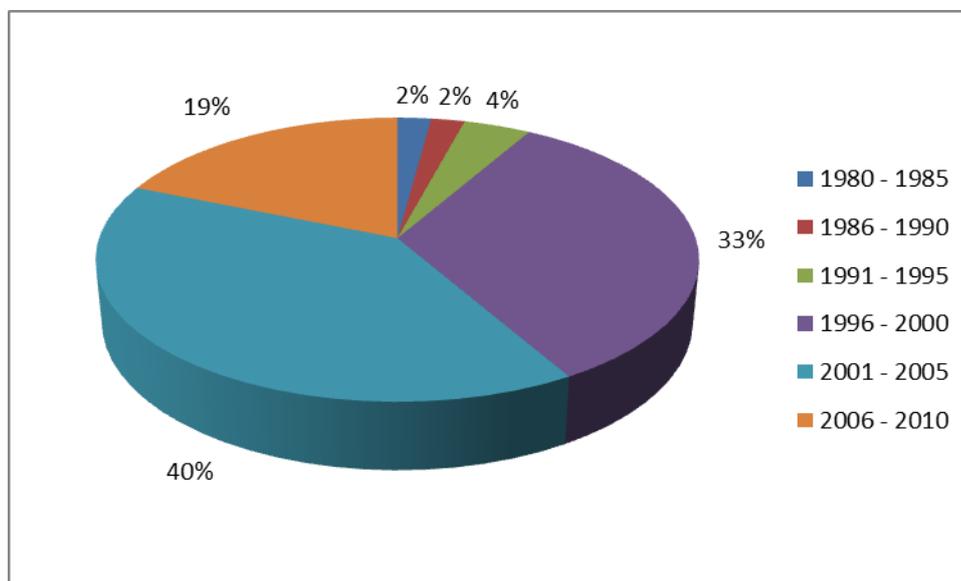
**Figure 7 – Number of graduated organizations**



Source: The Authors.

Another feature is that the majority of these incubators have only recently been established, for as Figure 8 shows, 40% were set up between 2001 and 2005 and another 19% between 2006 and 2010.

**Figure 8- Incubators`Creation**



Source: The Authors.

#### 4.4. 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 11 groups of directors. A woman has never been president of the association and only in 2007, 18 years after it was founded, was a woman, Prof. Gisa Helena Melo Bassalo<sup>8</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>9</sup>. He was reelected for the following term (2009 – 2011) and the female participation was enhanced by the election of Francilene Procópio Garcia<sup>10</sup> to the vice-presidency, while Prof. Gisa remained on the board.

#### 5. Conclusions

With regard to gender distribution in the posts at the incubators, women run few incubators (a mere 14%), and these tend to be on a smaller scale, with fewer than 5 (five) incubated companies, and

<sup>8</sup> Gisa Helena Melo Bassalo, professor at the Faculty of Architecture and Urbanism of the Federal University of Pará is the manager of that university's Technological Incubator.

<sup>9</sup> A researcher in the field of C&T&I, with a research project entitled "Temas de Tecnologia e Sociedade, Incluindo Questões de Tecnologia e Gênero, Tecnologia e Migrações e Tecnologia e Inclusão Social". 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", Folha de São Paulo newspaper, March 3, 2002; 3) Mulheres são Minorias, Estado de São Paulo newspaper, April 18, 1998; 4) O papel das Mulheres na C&T, Inovação, Gestão & Tecnologia, São Paulo, 2001).

<sup>10</sup> Professor at the Federal University of Campina Grande and head of the Paraíba Technology Park.

operating for a shorter time, with 40% having been set up between 2001 and 2005 and 19% between 2006 and 2010.

It was also observed that 52% of the women managing incubators did not identify any prospects for advancement in their career in the area of S&T&I; perhaps for lack of a career structure in the organizations that host the incubators, or of a suitable career description at the federal government's Ministry of Labor and Employment, which reflects the absence of a public policy to stimulate this segment.

As for the level of remuneration, this was not directly compared with the amounts paid to the male administrators. Nevertheless, one can affirm that the pay range for female administrators is a broad one, indicating a lack of parameters in the Brazilian labor market.

Regarding the characteristics of the women managing incubators, the majority have graduated in business administration, despite the considerable diversity of the qualifications of many of these administrators.

As far as the age range is concerned, the majority (between 30 and 50) are not in the age group of beginners in the labor market, although they have not been in the job for very long.

The difficulties described by these administrators are those inherent to the incubators' operational issues and are not gender related.

The characteristics of the incubators run by women are that they are smaller, recently established and with fewer graduated companies.

Female participation at ANPROTEC can be assessed by the generally limited involvement of women in representing the incubators at ANPROTEC and in the membership of the board of this national association. The participation of women at this level began only recently and over the last four years has been fairly timid.

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 S&T&I has been the objective of Brazilian public policies. Various call notices for engineers 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. This is reflected in the characteristics of the space that has been constructed. 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 that this is important to the Brazilian

economy (passing of the Innovation Law, the setting up of funding for grants, the development of programs for selecting innovative business projects to receive government resources, etc.).

However, within this consensus, the gender dimension has still not been addressed, either for consolidated professions or for newly emerging professions, where there is still male predomination. The space for consensus must include the gender dimension, in order for it to be inserted within public policy.

Future research could seek to identify the evolution of Brazilian public policies relating to the gender dimension.

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