Business Incubators in Brazil: Main Gaps to Be Explored by Academic Researchers

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Abstract: The business incubators have an essential role at any global entrepreneurial ecosystem. Through the support offered to entrepreneurs in terms of infrastructure and management, they reduce mortality risk of startup companies and contribute to better performance of the country's economy. In order to make a contribution to the academia and to business incubators, this paper is primarily engaged in performing a literature review on Brazilian and international academic basis in order to identify which are the main themes of research conducted involving Brazilian business incubators. The results show that most of the themes are associated with the services provision by the incubators and its management; however, there are many gaps yet to be explored by academic researchers, such as internal characteristics or the interrelationship between business incubators and triple helix.

Keywords: administration; management; business incubators; literature review; innovation; entrepreneurship; themes to be explored by academic researchers.

1. Introduction

According to the Global Entrepreneurship Monitor data (GEM), nowdays Brazil is well-known as one of the most entrepreneurial countries in the world, holding an Entrepreneurial Activity Rate (EAR) of approximately 17.2% (GEM, 2014). According to GEM, the EAR can be defined as the total number of individuals between 18 and 64 years who are starting a new business.

Of course, in an entrepreneur ecosystem it coexist all types of entrepreneurs, from the one who is starting a venture without structure to the one that, on the positive end, has an innovative idea which could revolutionize the guidelines of an economic segment. Perhaps for this last group, much more structured than the first one, the difference between failure and success resides in the aid and support provided by specialized agencies that assist entrepreneurs in suppressing their deficiencies and minimizes the risks associated with the entrance into highly competitive markets. This is precisely the main business incubator function.

According to ANTROPEC (2015), "the business incubator aims to support entrepreneurs so that they can develop new ideas and turn them into successful enterprises. For this, it offers infrastructure and management support, guiding them on business management and competitiveness, among other key issues for the development of a company. "

According to the latest study conducted by the National Promoting Innovative Ventures Entities Association in partnership with the Ministry of Science, Technology and Innovation, currently Brazil has 384 incubators in operation (ANPROTEC, 2011), a number considered low when compared to the economy's size. Worldwide, the total number of these entities is almost 5,000 and about half of them located in Europe and United States (900 units are located in Europe and ,400 units in USA according to Bruneel et al. (2012) and Cooper et al . (2012).

Despite of the small proportion of Brazilian business incubators in relation to global data, the entities located here present interesting economic indicators to be better explored. According to the ANPROTEC (2012), Brazil has 2,640 incubated companies, 2,509 graduated companies, 1,124 member companies, 45,599 jobs resulting from the activities of the incubators and gross sale of the order of $ 5 billion real. Other data indicate that the importance of business incubators can be found in the paper by Anholon & Silva (2015), which also show the importance and necessity of the incubator program expansion in Brazil.

In this context the following questions arise: how is it possible to maximize the business incubator program in Brazil? What are the current critical processes that can be improved? What are the management errors to be improved? There are many questions to be answered and the academia, through well-structured research in management, can provide valuable answers.

In order to make a contribution to academia and to the topic of business incubators, this paper will developed a literature review to answer the following question: "*Which are the main themes addressed by academic research related to the incubation process involving Brazilian entities and what are the potential issues to be better explored? "*

In order to answer this question, the following objectives were unfolded: 1) analyze the main Brazilian and international scientific bases looking for papers related to Brazilian business incubators; 2)

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perform the screening of paper related to business incubators on research in Brazil, analyze and classify the results and 3) establish conclusions on the main issues addressed and point out the gaps to be further explored by academia.

2. Literature Review

2.1 Definitions and concepts related to business incubators

Business incubators are organizations which promote innovative projects. According to ANTROPEC (2015), "the business incubator aims to support entrepreneurs so that they can develop new ideas and turn them into successful enterprises. In order to reach this objective, it offers infrastructure and management support guiding entrepreneurs on the business management, competitiveness and other key issues related to the development of a company".

According to the *National Business Incubation Association* (NBIA, 2015), incubators are organizations that promote the development of entrepreneurial companies, helping them to survive and develop during the initial phase, when they are most vulnerable. Through assessments, guidelines and consultancies, among other activities, it is

created an environment which enables the start-ups strengthening (Jeffrey, 2013).

In Brazil the first incubators emerged in the 80's - the first incubator was created in 1982 in São Carlos (SP) by the High Technology Park Foundation, as presented by Lahorgue (2004). Until 1987, there were few incubators operating in Brazil according to Franco *et al.* (2010).

The consolidation of the business incubators importance in Brazil occurred in 1987 with the creation of the ANPROTEC whose mission is to represent and defend the interests of incubators and technology parks, stimulating the creation and strengthening the knowledge-based companies. (Miziara & Carvalho, 2008 *apud* Sousa & Beuren, 2012). It is from this year that began the process of business incubators implementation in Brazil began, according to Medeiros & Atas (1995).

The Figure 1 shows the evolution of the number of business incubators in Brazil since 1988, taking into account data informed by Franco *et al.* (2010) and ANPROTEC (2015). It is important to mention that the available data in the literature starts in 1988 and ends in 2011. Also, the year of 2010 is omitted in the Figure 1 because no data was found in the literature for this specific year.

Figure 1: Evolution on the quantity of business incubators in Brazil
Source: elaborated by the authors based on Franco, *et al.* (2010) and ANPROTEC (2015)
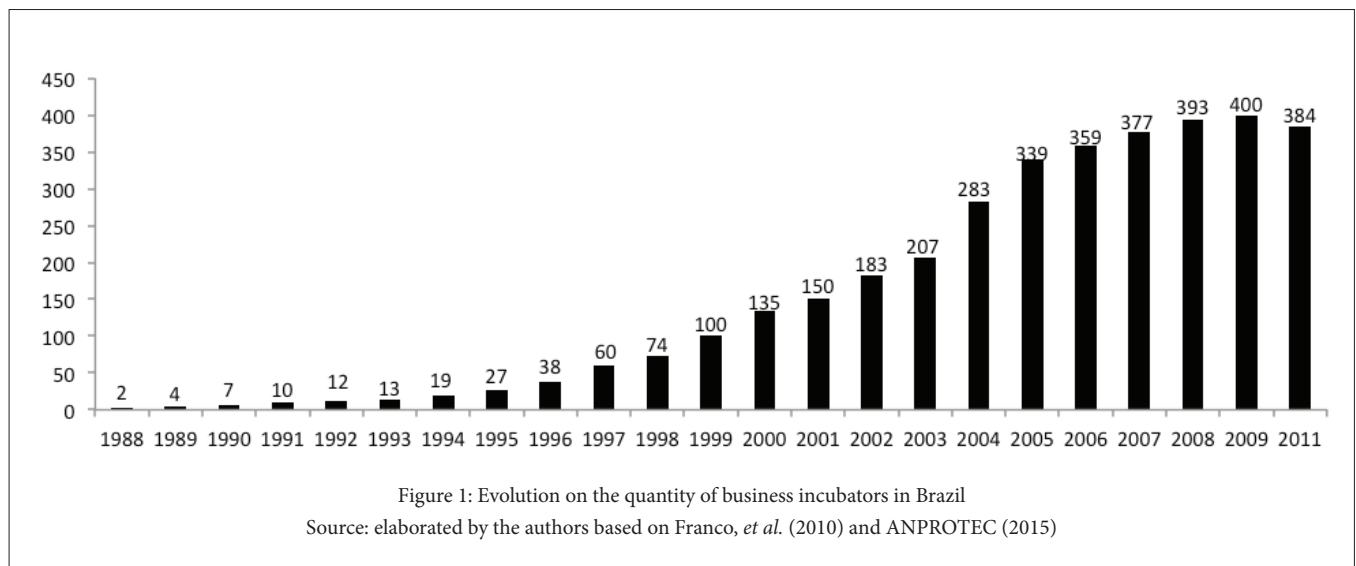
According to Souza & Beuren (2012), the main advantages of a company being supported by an incubator are the available infrastructure (services and resources), the quality of incubator services and access to development institutions. Regarding the disadvantages, most companies do not perceive any loss by participating in an incubation program, however, some of them mentioned difficulties in establishing cooperation and partnership with other incubated companies, difficulties in obtaining resources, funding and loans via incubator. Excessive self-protectionism from incubators' management was also mentioned a few times.

The period in which a company remains incubated, called incubation process, is divided into phases each one with distinct characteristics

and features (Raupp & Beuren, 2011). The number of phases and its corresponding names vary according to the referenced author. Medeiros & Atas (1995) presents four stages associated with incubating process: enterprise deployment in an incubator, growth, maturation and consolidation. Russi Junior (1999) details the process in five phases: establishment of the company and commencement of the operations, product or service launch, growth, maturation, consolidation and program shutdown.

According to Moreira (2002), the phases of the incubation process are:

selection phase: it is the selection of the project to be installed in the incubator;

- incubation phase: this phase is the formalization of the incubation and enterprise installation;
- development phase: the incubated company starts the development of their business strategies, planning activities, control of resources, among other factors. The resources are allocated to the development of the product or service, involving testing and prototyping. It is the most challenging phase of the incubation process;
- growth phase: It represents the expansion of the elements defined in the previous phase. The company will look for expanding trade, gaining new market shares or new consumer markets.
- liberation phase: the company is ready to leave the incubator. The turnover has reached a level which allows the company to migrate to a new physical host.

In addition to the incubation process, Zouain & Silveira (2006) presents other three processes developed by an incubator:

- pre-incubation process: It develops initiatives related to improving the quality and increasing the number of candidates for incubation programs;
- monitoring the graduated companies: it is the periodic analysis of the companies which are already graduated by the incubator and the measurement of its economic, social and technological impact;
- capture process: it is related to projects that aim to on capture financial resources from development institutions or funding agencies – from its preparation to its execution and monitoring.

Finally, Chandra & Fealey (2009) compares the incubation models in Brazil, China and USA in terms of adopted policies and practices. Although there are similarities in relation to features such as infrastructure provision and access to development finance institutions, there are differences in strategic focus, funding sources, types of incubators and government intervention in incubators. Table 1 presents this comparison in details.

Characteristic	Brazil	China	USA
Strategic focus	Foster entrepreneurship, economic development, job creation and technology commercialization	Social and economía mission	Economic development, technology transfer and commercialization
Sponsorship / Incubation Funding	Government., universities and some private funds	Government	Multiple levels of government, economic development organizations and private funding
Type of incubated business	High-tech, mixed in social, culture and design incubators	Mostly high-tech	Mixed, high-tech and specialized
Service mix	Both hard and soft services	Mostly tangible service of administrative nature	Tangible and specialized, value adding services
Financial services	Links to various sources of govt., funding lines, angels and VCs	Links to various sources of govt., grants, bank loans and some VC funding	Links to sources of financing with a few investing directly in incubates
Role of government	Visible, carrot and stick, synergistic approach	High – visible hand	Low supportive, but not dictatorial

Table 1. Incubation models in Brazil, China and USA. Source: Chandra & Fealey (2009)

3. Methodology

3.1 Scientific Research Classification

The classification of this scientific research follows the classical criteria. From the perspective of methods, this research presents deductive characteristics because it analyzes papers published in scientific bases and deduces conclusions based on this information. According to Lakatos & Marconi (2003), the deduction allows conclusions from true premises. To Silva & Menezes (2005), the deduction aims to explain the content of assumptions and facts through reason. Based on

Andrade (1999), this method was firstly introduced by René Descarte for which the only way to find a certainty is through the reason – the absolute principle of human knowledge.

Regarding the technical procedures this research can be classified as bibliographic because it employs materials already developed and published mainly books and scientific papers. According to Gil (2002) and Lakatos & Marconi (2003), the bibliographic research covers the entire literature already published in relation to the subject of study. Its purpose is to put the researcher in direct contact with all that has been written, said or filmed about the subject of study.

Considering the approach of the research question, this research is classified as a qualitative one since it owns a sequence of activities involving data reduction, categorization, interpretation and final conclusion. According to Gil (2002), this procedure represents a qualitative study. As per Silva & Menezes (2005), interpreting the data and assigning meanings to it is essential in the qualitative research process which does not require the use of statistical methods. Based on Godoy (1995), the qualitative research does not attempt to enumerate the events studied nor employs statistical instrumental in analyzing the data base.

Regarding the nature of this research, it is classified as applied. According to Silva & Menezes (2005), applied research is the one which generates knowledge for practical application and aims on solving specific problems.

Finally, in regards to the objective it is classified as exploratory. According to Gil (2002), the exploratory research aims on the improvement of ideas or on the discovery of intuitions in order to provide greater familiarity with the studied question.

3.2 Research Method

This scientific research consists in a review of the literature related to the theme business incubator in Brazil, highlighting the main issues surveyed. The investigated scientific bases were the Web of Science, SciELO and Periódicos Capes. It was also carried out specific research related to events and seminars at the ANPROTEC website. The terms used for the search in the scientific bases were "*incubadora de empresas*" combined with the word "*Brasil*" and their translations into English "*business incubators*" and "*Brazil*".

Initially it forty (40) papers were found, however, the sample to be studied consisted in thirty three (33) papers after deleting the duplicates. The themes addressed in these papers were identified and classified according to the categories presented in Table 2 which considers the phase's division mentioned by authors in the literature.

Group 1: MAIN PROCESS. Source: Moreira (2002), Raupp & Beuren (2011), Zouain & Silveira (2006)	
1.1 Pre-Incubation Process	
1.2 Incubation Process	11.2.1 Selection
	11.2.2 Incubation
	11.2.3 Development
	11.2.4 Growth
	11.2.5 Liberation
1.3 Monitoring the graduated companies	
1.4 Capture process	
Group 2: GENERAL CHARACTERISTICS. Source: Chandra & Fealey, (2009)	
2.1 Internal characteristics	2.1.1 Strategic Focus
	2.1.2 Type of Incubated Business
	2.1.3 Role of government
	2.1.4 Management (personnel, information)
	2.1.5 Quantity and geographical location
2.2 Interrelationship between incubators	
2.3 Relationship between incubators and external environment	2.3.1 Services
	2.3.2 Triple helix

Table 2. Categories by themes used to classify papers. Source: elaborated by the authors

In order to clarify the items presented in the general characteristics (Group 2 of Table 2), below there is a brief description of each item.

- Internal characteristics (2.1): this item refers to papers whose themes were about the internal environment characteristics of a business incubator;
- Strategic focus (2.1.1): It includes papers which discuss the scope of the business incubator's action. As an example, it is possible to mention the definition and selection of the market, customers and business strategies;

- Type of incubator (2.1.2): this item corresponds to researches which are about the business incubators types (technological, traditional, mixed, cooperative, private and others);
- Role of government (2.1.3): It refers to papers which discuss the influence and impact of the government on business incubators;
- Management (personnel, information) (2.1.4): this item corresponds to papers which investigate the proper way to manage a business incubator;
- Quantity and geographical location (2.1.5): It refers to papers which are about the evolution on the number of business incubators in Brazil, their locations and regional distribution;

- Interrelationship between business incubators (2.2): It includes papers which deal with both the relationship between national incubators and also the relation between national and world-wide incubators.
- Relationship between the incubators and external environment (2.3): It refers to papers which investigate the characteristcs related to the external environment of a business incubator;
- Services (2.3.1): It refers to papers which are about the quality of services provided by business incubators and their contribution to the incubated companies;

- Triple helix (2.3.2): It corresponds refers to papers which argue about with the impact of the triple helix (interaction among university, industry and government) in business incubators.

4. Results and Discussion

As presented on the item Research Method item (3.2), after the first screening there were thirty three (33) papers remaining. These papers were classified based on their themes and the result of this analysis is presented at Table 3.

| Item	Reference	Theme / Subject	Journal or Magazine
1	Andrade Junior (2012)	Evaluate the Brazilian experience on overcoming the difficulties of technology-based companies in incubators in order to propose improvement actions using incubators in Brazil as a reference.	*Journal of Technology Management & Innovation*
2	Anholon & Silva (2015)	Analyze the management system developed by the reference business incubator Business Center to Develop Advanced Technologies – CELTA, from the CERTI Foundation, located in Florianopolis (SC), in order to identify the features which lead to success.	Revista Geintec
3	Barquette (2002)	Examine the locational issues concerning technological incubators and high tech firms, trying to identify what are the most relevant factors for their creation and development.	Revista de Administração de Empresas (RAE)
4	Chandra & Fealey (2009)	Describe the incubation landscapes of the United States, China and Brazil indicating the similarities and differences in incubation approaches between the three countries.	*International Journal of Entrepreneurship*
5	Engelman *et al.* (2011)	Assess the quality of services provided by a business incubator, based on comparisons between the perceptions of business managers of incubated firms and the of the coordination of a multi sector technology based incubator.	Revista Eletrônica de Administração
6	Engelman & Fracasso (2013)	Verify how Brazilian technology incubators contribute to the internationalization of incubated companies from the point of view of their management.	Revista de Administração
7	Etzkowitz *et al.* (2005)	Analyze the evolution of Brazilian incubators considering the triple helix concept (*meta-innovation system*).	*Research Policy*
8	Ferreira *et al.* (2008)	Present a proposal management from through performance indicators to technological based enterprises in development and growth.	Produção
9	Fiates *et al.* (2013)	Analyze the characteristics of the internationalization of small and medium-sized technology-based companies, incubated and graduated ones in order to identify the role of incubators in the process.	Revista Eletrônica de Estratégia & Negócios
10	Fonseca & Martins (2010)	Contribute to academic reflections on the role of business incubators as institutional agents to promote environmental performance by small firms.	Produção
11	Fonseca & Jabbour (2012)	Review the literature on green management and smaller enterprises, business incubator performance and the greening of business incubators.	*Technovation*
12	Franco *et al.* (2010)	Analyze the evolution on the number of incubators of Brazilian enterprises and sweats regional distribution.	Locus Científico
13	Gallon *et al.* (2009)	Describe the relationships network and identify the importance of these relationships to the organizational performance of small incubated ITBs in the perception of the entrepreneurs.	Revista de Gestão da Tecnologia e Sistemas de Informação
14	Gaspar (2008)	Analyze the influence of venture capital and business incubation on the decision to create new companies and in their success, that is, in the survival of the startups.	Revista Portuguesa e Brasileira de Gestão

Item	Reference	Theme / Subject	Journal or Magazine
15	Gonçalves & Freire (2007)	Analyze the process of information communication (information transfer and its transformation into knowledge) in a technological incubator at the Gênesis Institute of Pontifícia Universidade Católica (PUC) located in Rio de Janeiro.	Ciência da Informação
16	Gurgel (2007)	Show the importance of incubators to the creation and implantation of lasting and healthy companies, as well as for the overcoming of the high index of companies' mortality.	Revista Ibero-Americana de Estratégia
17	Iacono et al. (2011)	In light of the new innovation paradigm (interactive nature of innovation), evaluate the cooperation and interaction of based-technology incubators enterprises.	Revista de Administração Pública (RAP)
18	Leca et. al (2014)	Present the challenges and contributions of the academic area to the worker cooperatives incubators.	*Organization*
19	Potrich et al. (2013)	Characterize the information security management on the context of incubated and graduated companies of the Technology Incubator of Santa Maria (ITSM).	Revista GEINTEC
20	Raupp & Beuren (2011)	Outline the profile of the support offered by the Brazilian incubators to the incubated companies.	Revista Eletrônica de Administração
21	Ribeiro et al. (2005)	Generate understanding about the role of government in promoting technological innovation an incubator of companies. Case study performed in the municipal district of Santa Rita do Sapucaí (MG).	Cadernos EBAPE.BR
22	Robinson (2010)	Propose a three stage model of the development of business incubation practices in emerging markets.	*Journal of Technology Management & Innovation*
23	Shin & Lamy (2006)	Examine paths of commercial learning in incubators based on the scientist-entrepreneurs vision which represents the acme of strong science and enterprise interaction.	Scientiezudia
24	Silva et. al. (2009)	Identify and explain similarities and differences in characteristics of entrepreneurs at incubators in Brazil and Portugal.	Revista de Administração Contemporânea (RAC)
25	Silva et al. (2012)	Evaluate the relationship between the functions performed by managers and the results obtained by the incubator.	Produção
26	Silveira & Bazzo (2009)	Expose the conception that entrepreneurs and managers involved with incubators have about science, technology, innovation and their relations in the social context.	Ciência & Educação
27	Sousa & Beuren (2012)	Highlight the relevance of the services and resources available at an incubator, as well as identify the expectations perceived by the entrepreneurs in the incubation process.	Revista GESTÃO.Org
28	Van Hemmen et al. (2013)	Demonstrate the relationship between charismatic leadership and entrepreneurship, which play a key role in the development of business incubators.	Innovar
29	Veloso Filho & Nogueira (2006)	Obtain data and identify relevant local or regional technological promotion and innovation systems in Brazil.	Interações
30	Xavier *et. al* (2008)	Analyze the contribution of business incubators for small IT business. A study case and deep research was developed in three Brazilian IT incubators.	Revista de Gestão da Tecnologia e Sistemas de Informação
31	Zimmermann *et al.* (2009)	Analyze economic and innovative aspects of small technologic companies incubated at the Business Center to Develop Advanced Technologies (CELTA) located in Florianopolis (SC).	Análise
32	Zouain & Silveira (2006)	Stress the importance over the past few years of the incubators movement in Brazil and underscore the need, on the part of incubators, to adopt management models that are more relevant to the Brazilian reality.	Cadernos EBAPE.BR
33	Zouain & Torres (2005)	Analyze innovations in work relationships allegedly to be found in Brazilian incubators.	Cadernos EBAPE.BR

Table 3. Papers analyzed after the first screening. Source: elaborated by authors.
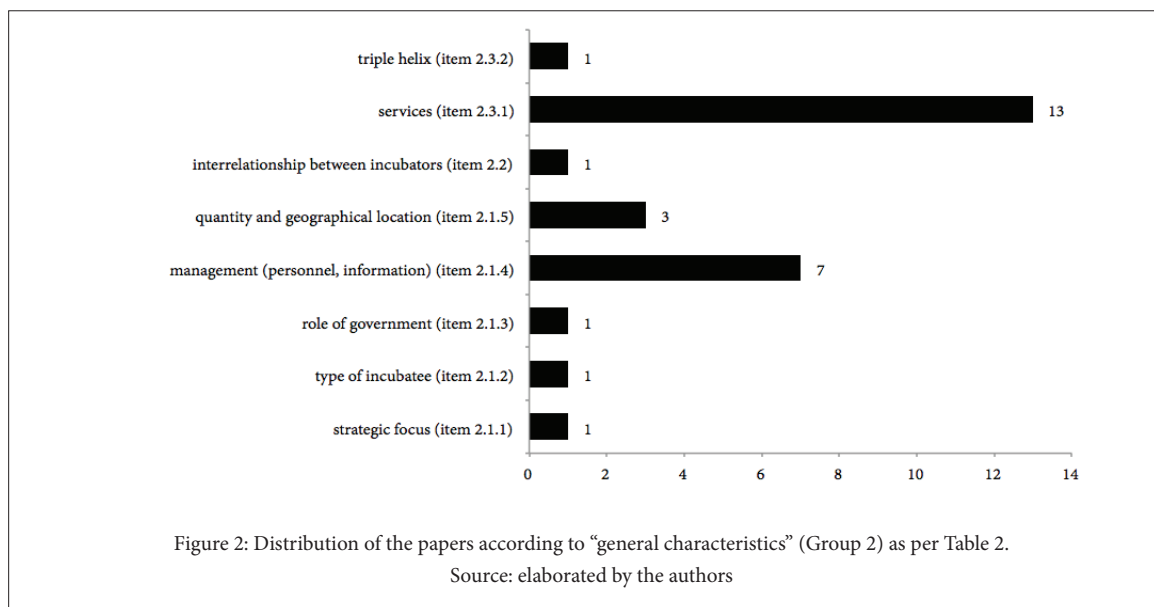
Based on the database above, a first classification according to the groups presented in Table 2 was elaborated and the results are presented on Figure 1. It shows that 15% of the papers have their themes associated with "main process" (Group 1) and 85% of the papers have their themes associated with "general characteristics" (Group 2), which demonstrate a high possibility of researches which can be developed in Group 1. In numbers, the Group 1 has only five (5) papers and the Group 2 has twenty eight (28) papers. In this scenario, it is important to mention Zouain & Silveira (2006), who claim that the "main process" (Group 1) has a strict relation with the efficiency of an incubator to turn incubates into successful companies.

Figure 1: Distribution of the papers according to the groups presented in Table 2

Source: elaborated by the authors
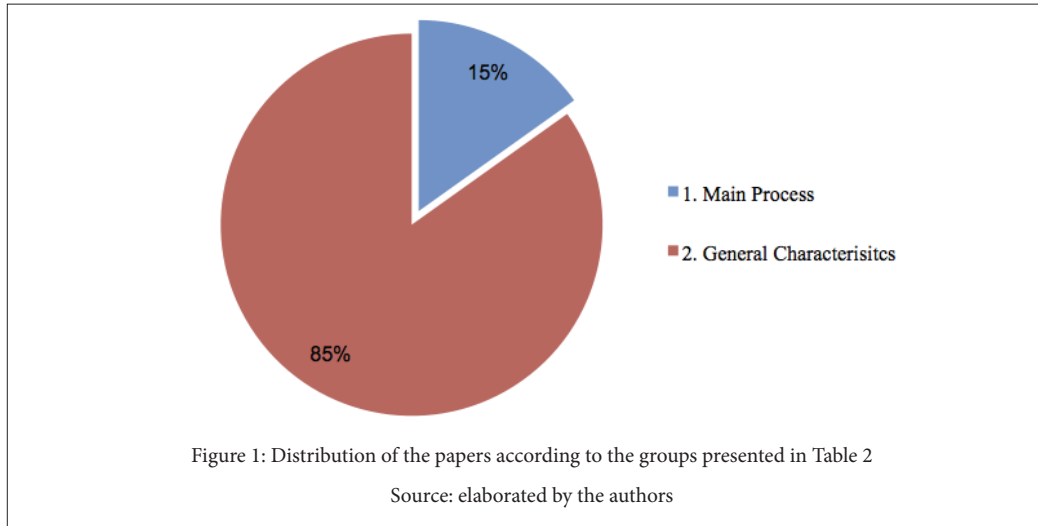
Specifically for papers associated with "main process" (Group 1), five (5) papers are connected with the "incubation process" (item 1.2). Four (4) papers were related to "development" (item 1.2.3) and one (1) paper was associated with "growth" (item 1.2.4). Regarding the other topics presented in Group 1 no studies have been found published in scientific papers, which shows the great potential for researchers to explore these themes. Additionally, Zouain & Silveira (2006) highlights the high importance of the "pre-incubation process" (item 1.1), the "selection" (item 1.2.1) and "monitoring the graduated companies" (item 1.3) to the success of an incubation program, corroborating the need for researches and management innovation in these areas.

Regarding the twenty eight (28) papers related to the "general characteristics" (Group 2), the researched themes are distributed as follows: one (1) paper associated with "strategic focus" (item 2.1.1), one (1) paper for "type of incubated business" (item 2.1.2); one (1) item related to "government role" (item 2.1.3), seven (7) papers for "management (personnel, information)" (item 2.1.4), three (3) papers associated with "quantity and geographical location" (item 2.1.5), one (1) paper related to the "interrelationship between incubators" (item 2.2), thirteen (13) papers related to "services" (item 2.3.1), and one (1) paper associated with "triple helix" (item 2.3.2). Figure 2 presents all this data in a graphic.

Figure 2: Distribution of the papers according to "general characteristics" (Group 2) as per Table 2.

Source: elaborated by the authors

Based on the above figure, it can be noted the need for a greater number of scientific researches related to the "strategic focus" (item 2.1.1), the "type of incubated business" (item 2.1.2), the "role of government" (item 2.1.3), the "interrelationship between incubators" (item 2.2) and "triple helix" (item 2.3.2). According to Anholon & Silva (2015), when analyzing the CELTA incubator in Florianópolis – Santa Catarina, all of these items are extremely important to the success of an incubation program.

Among all the items above, the authors of this papers highlight the urgent need for further research about the "triple helix" (item 2.3.2), or in another words, about the interrelation of incubators with universities, government and companies. According to Chandra & Fealey (2009), in other countries like China and US the interfaces between the groups mentioned are better developed and more mature than those ones observed in the Brazilian incubation program.

The greatest amount of researches was associated with "services" (item 2.3.1), which addresses the work offered provided by the incubators. Besides the quality of the services provided, these researches also discuss current themes such as sustainable practices, self-financing of incubators and consultancy provided by incubators to companies regarding their internationalization.

5. Conclusion

As mentioned above, this paper was engaged in the analysis of the main bases of national and international scientific data in order to identify the most important themes of research associated with to the incubation program for Brazilian companies. The search in scientific bases enabled the finding of thirty three (33) papers which were analyzed and divided into categories structured according to the authors Moreira (2002), Zouain & Silveira (2006), Raupp & Beuren (2011) and Chandra & Fealey, (2009).

In light of the results found, it was possible to answer the proposed question issue. The main researched theme on Brazilian incubators is related to their characteristics, primarily the provided services and secondarily the management (personnel, information). This topic presented a significant higher number of scientific researches than any other themes which had one, at maximum, four published works.

The conclusion is that there are many areas to be explored in scientific research, which can provide positive results to the Brazilian incubation program. For the "main process" (Group 1) the gaps to be explored by researchers are noticed in all items. For the "general characteristics" (Group 2) the gaps to be explored by researchers are mainly perceived in the "internal characteristics" (item 2.1), "interrelationship between incubators" (item 2.2) and "triple helix" (item 2.3.2).

Thus, it is expected that the results and conclusions presented in this paper can be valuable to both the academia and the business incubators as a starting point for further research to provide better results to the Brazilian incubation program.

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