
Knowledge management in incubated companies: proposal of model to enhance managerial skills

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Abstract: The main objective of this research is to analyse the literature and 156 companies located in 10 business incubators to determine their major management knowledge gaps and propose a model to enhance managerial skills. The research methodology initially adopted was literature review and survey, and afterwards we used descriptive analysis for the proposed model developed. The results showed that despite the companies going through a triage process to join the incubation process, there are still many gaps related to managerial capacity among the 156 enterprises analysed. In order of priority, the gaps are related to strategies, marketing, finance and accounting, quality, human resources, innovation and complementary capacities. The proposed model included these areas, besides practical trainings, assessment mechanisms and analysis of entrepreneurial skills. Managers of business incubators and other researchers can make use of its results for the development of other models, since this paper represents a contribution to management of knowledge applied in business incubators and micro and small companies.

Keywords: administration; business; business incubator; entrepreneurship; knowledge management; management; managerial skills; micro and small companies; proposal of model; training.

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1 Introduction

According to Al-Mubarak and Busler (2014), internationally, the incubation business model has been extremely important in the growth and economic development of countries. It is thought that today there are a total of 7,000 incubators distributed around the world, 1800 of them in the United States and 900 in Europe. Despite smaller numbers in relation to the amount of installed incubators, now totalling 384 entities, according to the latest survey by the Ministry of Science and Technology (ANPROTEC, 2012), in Brazil also great results have been seen in relation to these entities in the assistance of micro and small start-ups.

To clarify the incubators' importance for the Brazilian economy, it is necessary to analyse in more detail its main target, that is, the micro and small Brazilian companies. According to the data of the Brazilian Service of Support for Micro and Small Enterprises (SEBRAE, 2013), those organisations are responsible for hiring 69% of the economically active population in the urban environment and contribute with 24% of net wealth

generated by the nation. Such data, when associated with entrepreneurial activities, demonstrate a great prospect for the country. According to a survey conducted annually by the Babson College, in the United States, and by the London Business School, in England, Brazil is characterised as one of the most entrepreneurial countries in the world (GEM, 2013; Williams and Youssef, 2013). As noted, in Brazil the most used criteria for micro and small enterprises classification is the number of employees allocated, but the authors of this paper also considered the analysis conducted by Eikebrokk and Olsen (2007) and Longenecker *et al.* (2013) about companies size to be of great value.

Despite the great correlation between the importance of micro and small businesses to the country and high rates of entrepreneurship, Brazil, until today, still has a high mortality rate for enterprises with up to 4 years of existence, when compared to developed countries. According to MCTI (2014), and MCTI (2014), the mortality rate for this type of companies and in the considered period reaches 59.9%. The explanation for this occurrence lies in the fact that most Brazilian entrepreneurs do not have managerial knowledge or are unprepared to face a highly competitive market (Williams and Youssef, 2013). Babson College and London Business School survey also showed that in Brazil most companies are created by necessity and not by opportunity. People undertake businesses when they lose a job or when they need to increase their income, not having, thus, enough preparation to fulfil this challenge (GEM, 2013).

It is in this context that support entities to micro and small enterprises as business incubators stand out. They are one of the main artifices to correct the errors mentioned and strengthen the participation of this type of companies in the Brazilian economy. They enable, especially entrepreneurs of smaller businesses, higher chances of success through training and complementary consulting in the areas of strategy, marketing, finance, quality, human resources, operations and innovations, among others (Allen and Rahman, 1985; Wu and Huarng, 2015).

Focusing on the situation of incubators, we observed that a lot of new business incubators companies have gaps in the managerial capacity and this leads to questions related to the type of these gaps, the best training method, the business incubator role as a facilitator in the acquisition of new knowledge and assessment procedures to verify the value given to the enterprises. According to Bohringer (2006), there are possibilities for a broad debate about the management of knowledge use in business incubators taking into account acquisition, creation, retention, sharing and distributing.

In order to offer a contribution to the micro and small companies and business incubators, more precisely in the knowledge management, this paper aims to analyse the managerial needs of 156 companies located in different business incubators and, based on this, answer the following research issue: how should a training model be structured to enhance managerial skills of newly incubated Brazilian companies?

Derived from this research issue are three main goals that were structured for this study:

- 1 Raise the main points of knowledge management in literature that can be applied to the reality of the business incubators and their companies.
- 2 Do a survey in order to know their needs for increased managerial training.

- 3 Define a training structure that is appropriate to the reality of Brazilian incubation programmes.

It is important to mention that this paper has a great academic relevance, since there are few researches about the knowledge management in business incubators. Adding to this the fact that business incubators represent an important mechanism for micro and small companies' development in any country, there are sufficient elements to justify the relevance of this research.

2 Literature review and theoretical framework

2.1 Business incubators

According to Jeffrey (2013) and Mas-Verdú, Ribeiro-Soriano and Roig-Tierno (2015), a business incubator can be understood as a mechanism that encourages the creation and development of micro and small enterprises in the service sector, technology-based or small manufacturing, through the complementary training of the entrepreneur in technical and managerial aspects.

The definition of Chandra and Fealey (2009) emphasises the importance of business incubators as an innovative environment. According to these authors, a business incubator can be defined as an environment that fosters the creation and development of companies and products (goods and services), particularly those innovative and intensive intellectual content (products in which a portion of the intellectual work is higher than the amount owed to all other inputs).

According to Phan, Siegel and Wrigth (2005), Grimaldi and Grandi (2005) and Chen (2009), a business incubator is an organisation with the mission of helping emerging entrepreneurs through the agglomeration of knowledge and resource sharing. Its growth in recent years has become an important topic in academic study, especially in aspects related to performance and associations with universities or large companies.

Historically, the incubators movement began in 1959 in New York City, when a tractor factory, Massey Ferguson, closed and left a large number of workers unemployed. The factory facilities were purchased by Joseph Mancuso, who decided to subdivide it into smaller boxes and sublet them to small enterprises. Besides, the facilities had a reduced price, and the companies also shared some types of equipment and administrative services (Kuratko and LaFollette, 1986).

A decade later, in the 1970s, the American government decided to stimulate the creation of new companies in the Silicon Valley by a similar system as proposed by Joseph Mancuso. At that time, the government offered legal, administrative and technical advice to newly graduated young people to start their ventures. Referring to the system originally proposed by Joseph Mancuso, the American government called this system as business incubators (Kuratko and LaFollette, 1986).

In Brazil, according to the National Association of Entities Promoting Advanced Technology Ventures (ANPROTEC, 2012), the incubators movement began in 1984, but it started gaining importance in 1987 with the International Seminar of Technology Parks, in Rio de Janeiro, and the creation of the ANPROTEC, one structure to connect all business incubators and activities related to innovation and entrepreneurship in Brazil.

Currently, Brazil has 384 business incubators responsible for the guidance of 2,640 companies. Regarding the activity aspect, 55% of Brazilian business incubators are technological, 19% are traditional, 18% are mixed and 8% are other types (ANPROTEC, 2012). According to MCTI (2014), a technology business incubator receives companies whose products, processes or services are generated from the results of applied research, in which technology presents high added value. Traditional incubators are those related to traditional economy sectors, which hold widespread technology and want to add value to their products, processes or services through an increase in their technological level. Mixed incubators, in turn, are those that include companies of the two types described above.

Finally, to emphasise the incubation program benefits in the early years, we highlight a survey by the Ministry of Science, Technology and Innovation with 365 graduated companies (MCTI, 2014). According to the results of that survey, the mortality rate for companies that have gone through the incubation process was dramatically lower when compared to the other companies that have not gone through the same experience. Moreover, the results also showed that companies that have gone through incubation process demonstrate higher concern for the quality and competitiveness of their products.

2.2 Business incubators and knowledge management

This literature review topic aims to present the main concepts of knowledge management that were used in preparing the proposed model, not intending in any way to exhaust the possibilities of debates and discussions on this topic. We believe that regardless of the size of the organisations analysed, the concepts presented may be used and disseminated widely. The driving hypotheses of this research are presented in this topic.

Beforehand, it is interesting to highlight the importance of organisational learning for a company. According to Garvin (1993), organisational learning provides companies a higher level of intelligence and facilitates employees' adaptation in facing constant changes. Smarter companies also encourage their employees to seek new ways to innovate and to solve everyday problems and not to be afraid of making mistakes. Argyris and Schön (1978) and Gonzalez, Martins, and Toledo (2014) do not see the errors within an organisation as faults but as learning opportunities. Detecting and correcting errors in a process is seen as a deviation between the desired intentions and what actually happened.

We fully agree with this information because we believe that newly incubated companies have to take opportunity to make mistakes and correct their actions while they are still under the incubators' tutelage while becoming more resistant to the challenges in the market. From this statement, we derive our first hypothesis:

H1: The proposed model should include theoretical and practical training activities, since it will be through these practical activities that consultants will be able to identify errors in the company's management and fix them before the full entry in the market.

Still in terms of broader definitions, Balestrin, Vargas and Fayard (2008) and Gonzalez, Martins, and Toledo (2014) define knowledge management as a process comprising acquisition stages, retention and distribution of knowledge and skills, requiring that such processes are able to maximise access to knowledge across the entire organisation. For them, what accelerates learning of new employees is the construction of more knowledge

(intellectual capital) to increase the organisational capacitation. The idea of acquiring stages, retaining stage, distributing knowledge and skills and maximising the access to the knowledge was widely used in the model proposed in this article.

According to Alvesson and Kärreman (2001), Wong and Aspinwall (2004) and Filippini *et al.* (2012), knowledge needs to be managed within an organisational structure that can bring benefits and provide performance improvements. This management must take into account the connection between people, administrative processes and existing technologies to achieve development and maturation. This is also true in the case of incubated companies. As far as we consider the incubator as an organisation, each company should grow gradually as the connections between them are solidifying, processes are improving and technologies are evolving.

The evolution of technology is important, but it must be clear that it is not characterised as a major factor for knowledge management success. Many companies invest heavily in technology to support management of knowledge resources (in most cases the focus is IT), but many of them end up failing, as mentioned by Butler (2003), Schultze and Boland (2000), Hsu *et al.* (2007) and Pfeffer and Sutton (1999). For incubated companies we believe that this recommendation should be followed; after all, the exchange of information and its flow in all directions, aiming at providing growth to incubated companies, are being considered in the model structure.

Another appreciated and valued concept within the business incubators environment is related to the idea that the main objective of knowledge management is to create a common space for individuals to interact, exchange, create and mature the knowledge, according to Margaryan *et al.* (2014). Durst and Edvardsson (2012) and Filippini *et al.* (2012) also believe that organisations must engage in developing a construction that facilitates and encourages proper creation, sharing and use of knowledge. According to these authors, this is the way to create organisational subunits of knowledge used in solving everyday problems in various contexts. Following this line of reasoning, each newly incubated company can be considered an organisational subunit of knowledge of its incubator.

Regarding management of knowledge models focused on the reality of smaller companies, it is important to mention the studies of Beijerse (2000), Wong and Aspinwall (2004) and Balestrin, Vargas and Fayard (2008), which we call as state-of-the-art research.

The research developed by Beijerse (2000) focuses on an undeveloped field by researchers, knowledge management in smaller companies, and therefore, stands out. In his research the author analysed the knowledge management linked to the reality of small business and, subsequently, developed a model to analyse 12 companies in the service industrial sector. As a result, the author proposes 79 instruments linked to knowledge management, which are divided into the categories: determining gaps, evaluation, and acquisition, development and sharing.

Wong and Aspinwall (2004) also agree that most literature on knowledge management and research is focused on the reality of large organisations, and issues relevant to smaller companies are often neglected. For this reason, they focus on characteristics of smaller companies, their advantages and disadvantages, strengths and weaknesses, and their main problems and issues related to management of knowledge. According to the authors, recognition of all these elements is essential to provide a more appropriate approach.

Balestrin, Vargas and Fayard (2008) conducted a case study with 35 small textile companies in the southern Brazil, proposing a broader approach to the creation of organisational knowledge. The main results made it clear that a network of cooperation and assistance between companies leads to collective learning and supports creation of knowledge. This work was extremely motivating for us to embark on this research.

From the statements of authors presented, we derive our second and third hypotheses:

H2: The proposed model should enable the exchange of experiences between the incubated companies, since each one of them can be seen as a knowledge subunit and may share their knowledge.

H3: The proposed model should have a mechanism for assessment of companies, in order to verify the added value provided to enterprises.

Regarding the studies focusing on main areas of management that enable the growth of micro and small businesses, what stands out yet today is the paper of Kazanjian (1988) that analyses the problems which inhibit their evolution. According to him, the main problems are related to general management, financial management, marketing and selling, market research, product, engineering, production, distribution, legal affairs and personnel. The authors of this paper believe that areas such as finance and accounting, marketing, operations, quality, strategy, innovation, human resources and complementary training cover the needs presented by Kazanjian (1988) and from them derive the fourth and final hypothesis.

H4: The proposed model must consider managerial needs in areas such as finance and accounting, marketing, operations, quality, strategy, innovation, human resources, and complementary training.

3 Method

Initially, the research presented in this paper was divided into two parts:

- 1 To do a survey with companies and to determine the main gaps in managerial training of newly incubated companies in eight managerial areas.
- 2 To propose a model for managerial training based on the literature and information gathered.

The questionnaire was structured in two parts, characterisation and training needs. For the characterisation part, information analysed included name, address, phone, e-mail contact, type of business (manufacturing or service), economy sector, owner's education level and company's age. Related to the training, information analysed included needs in eight managerial areas defined by Kazanjian (1988), which are as follows: finance and accounting, marketing, operations, quality, strategy, innovation, human resources and complementary training. For these managerial areas, the entrepreneurs should assign a grade of 1 to 10 according to their training needs, where grade 1 corresponds to the term 'not necessary' and grade 10 corresponds to 'extremely necessary.'

Also, for each of the major areas, micro and small entrepreneurs should select the five topics most relevant to their needs among the 20 works cited by the authors and elaborated in bibliographies (Bond and McCracken, 2005; Darcy *et al.*, 2014; Doherty

and Norton, 2013; Gardet and Mothe, 2012; Gilmore, 2011; Gilmore, Carson and Grant, 2001; Gitman and Zutter, 2011; Guo and Cao, 2014; Hudson, Smart and Bourne, 2001; İlkay and Aslan, 2012; Löfving, Säfsten and Winroth, 2014; Maire, Bronet and Pillet, 2008; Maital and Seshadri, 2013; Mathis and Jackson, 2010; McAdam, 2000; McAdam, Reid and Shevlin, 2014; McLarty, 1998; Minna, 2014; Pickernell *et al.*, 2013; Poolton *et al.*, 2006; Psomas, Fotopoulos and Kafetzopoulos, 2010; Pyzdek and Keller, 2012; Rymaszewska, 2014; Schmidt *et al.*, 2007; Lopez-Bonilha and Lopez-Bonilha, 2014; Slack, Chambers and Johnston, 2009; Tetteh and Burn, 2001; Wagner and Paton, 2014; Wincent, 2005; Zheng, O'Neill and Morrison, 2009; Biancolini, Macari and Pereira, 2013). More important, for these topics we didn't request the entrepreneurs to prioritise them, just pointed out these works to them, and we explained each topic. The questionnaire used for the survey data with main areas and their topics are presented in Appendix 1.

We selected 10 business incubators, and through them we had the participation of 156 companies newly added to the incubation processes. We considered newly incubated companies as those that were in the incubator for less than 4 months and, for this, we sought to reconcile the research development with the cycle of each business incubator.

We state that the choice of those 156 companies was made by means of non-probability sample for trial. This technique, according to Selltitz, Wrightsman and Cook (1974), is used when the researcher, through good judgement and appropriate strategy, chooses the cases they believe are necessary for the sample to meet the research needs, usually those defined as typical of the population. The sample was select by convenience, in which the researcher's judgement is used to select the sample elements (Hair *et al.*, 2009, p.247). As already explained, among the judging criteria, the convenience was a choice factor of the study sample.

Over 4 months, between January and April 2014, researchers visited 10 business incubators in the State of São Paulo and applied the questionnaire. On average, the incubators had 16 incubated companies; there were 25 companies in the larger one and 9 companies in the smaller one.

The results were analysed based on the range for the true population mean, calculated through mean and standard deviations of the values reported by respondents and considering a confidence level of 95%. From this, it was possible to create a scale of importance to the managerial areas.

On the basis of the result analysis obtained through the survey, the authors set out for the proposed model development, including the collaboration of the business incubators managers. Thereafter 10 meetings were held, which occurred between May and July 2014, and later, about 2 months' time was reserved for writing this article.

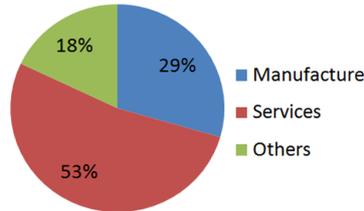
4 Results and discussions

4.1 Survey results

As mentioned in item 3, a survey was done with 156 companies that were beginning the incubation process at 10 business incubators; initially, it is important to present the characteristics of this sample. As for business classifications, most of the analysed

companies belong to service sector (53%), appear in sequence manufacture companies (29%) and, finally, companies in other sectors (18%); these details are shown in Figure 1.

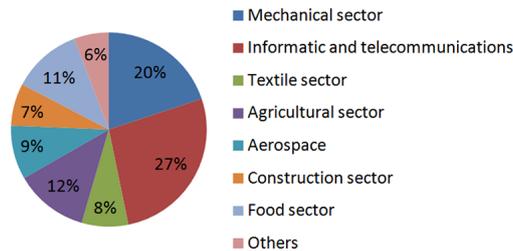
Figure 1 Business classification (see online version for colours)



Source: authors' own

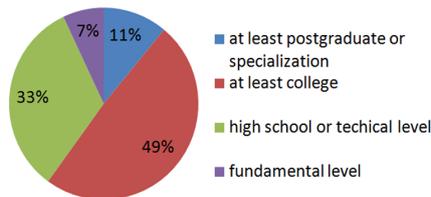
Focusing on the economy sector, it can be seen that 27% of companies act in the computer and telecommunications industry, followed by mechanical sector with 20% of companies. The presence of other sectors range from 10 to 20%, as shown in Figure 2. Regarding the education level of respondents, 11% have at least postgraduate or specialisation, 49% have at least college, 33% have high school or technical level and only 7% had basic level of education as shown in Figure 3.

Figure 2 Companies analysed by economy sector (see online version for colours)



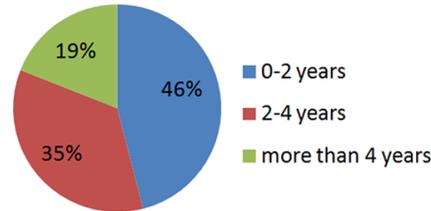
Source: authors' own

Figure 3 Education level of respondents (see online version for colours)



Source: authors' own

The final criterion used to complete the sample characterisation was the companies' age. It can be seen that most of these companies were in existence for 0 to 2 years (46%), followed by companies in existence for 2 to 4 years (35%) and, finally, companies with over 4 years of existence (19%), as shown in Figure 4.

Figure 4 Age of the companies (see online version for colours)

Source: authors' own

The second part of the questionnaire had as main objective the identification of companies' needs in terms of managerial training. We structured eight major managerial areas and allocated for each one of them 20 training topics. Each entrepreneur should first rank the priorities in relation to the areas (giving grades 1 to 10) and afterwards choose the most relevant topics within those 20 topics. On the basis of analysis done with 156 incubated companies and analysing their managerial characteristics, the researchers of this paper concluded that the main needs of training for the sample analysed are as follows: strategy and marketing (first or second position); finance/accounting and quality (third or fourth position); operations, human resources and innovation (fifth, sixth, or seventh position); and other complementary training (eighth position). The position allocation for each managerial area may range according the possible mean values, considering the confidence level is 95%, as shown Table 1.

Table 1 Data for the results of each managerial area

Training	μ	S	CI	R_{max} R_{min}	Scale	Allocation in the proposed model
Strategy	7.38	1.96	± 0.31	7.07 7.69	1° or 2°	First plan
Marketing	7.02	1.52	± 0.24	6.78 7.26	1° or 2°	
Finance and accounting	6.24	1.45	± 0.24	6.01 6.47	3° or 4°	Second plan
Quality	5.90	2.03	± 0.32	5.58 6.22	3° or 4°	
Human resources	5.26	1.61	± 0.25	5.01 5.51	5°, 6°, or 7°	Third or fourth plan
Operations	5.10	1.24	± 0.19	4.91 5.29	5°, 6°, or 7°	
Innovation	5.10	2.32	± 0.36	4.74 5.46	5°, 6°, or 7°	
Complementary	4.30	2.21	± 0.35	3.95 4.65	8°	Fourth plan

μ , Mean; S , Standard deviation; CI, Confidence Interval for 95%; R, Range for the true population mean. Values of R_{max} and R_{min} .

Source: Authors' own.

The five most relevant topics among the 20 possible training topics to be chosen in each managerial area according to the entrepreneurs are presented in Table 2. The percentage of citations for each of these five items is presented in sequence. Only descriptive statistics were used for these topics.

Table 2 Topics of the highest relevance within each area

<i>Type of training</i>	<i>Five most relevant topics in each area</i>
Strategy	<ul style="list-style-type: none"> • Competitive advantage (25.3%) • Core business (24.3%) • Definition of goals and objectives (19.3%) • Analysis of competitors, market and definition of scenarios (18.5%) • Performance indicators (17.3%)
Marketing	<ul style="list-style-type: none"> • Concepts of marketing, sales management and their tools (32.5%) • Product, price, place and promotion (29.3%) • The importance of fairs and events for companies (19.3%) • The life cycle of a product (18.9 %) • Listening to the customer voice (17.3%)
Finance and accounting	<ul style="list-style-type: none"> • Tax burden (32.5%). • Costs and working capital (19.4%). • Cash flow (18.2%) • Return on investment (16.2%) • Contribution margin (14.5%)
Quality	<ul style="list-style-type: none"> • Certification and quality standards (21.5%) • Indicators performance to quality (18.3%) • Company organisation (17.6%) • Quality tools (16.9%) • Methods for problems solution (15.9%)
Human resources	<ul style="list-style-type: none"> • Relationship between employees and employers (25.6%) • Recruitment and selection (23.2%) • Performance evaluation (22.4%) • Managing internal conflicts (21.9%) • Employees' motivation and their tools (15.3%)
Operations	<ul style="list-style-type: none"> • Customer's requirements in the operations' point of view (19.8%) • Performance indicators to operations (19.7%) • Activities optimisation (16.5%) • Goods production (16.2%) • Services production (15.3%)
Innovation	<ul style="list-style-type: none"> • Innovation agencies in Brazil (32.52%) • How to be attractive to investment funds (24.35%) • Competitiveness and innovation (22.12%) • Innovation on products and services (19.79%) • Innovation in organisational management (18.45%)
Complementary	<ul style="list-style-type: none"> • 80 different types of responses • stood out: 12% of entrepreneurs had questions about the business incubators role and how they could take full advantage of all the collaboration effort that was being offered

Source: authors' own

As we can see, the needs in strategy and marketing are given the maximum priority in this sample (first or second position, considering range for the true population mean). When analysing more carefully, we realised that business incubators companies usually have an innovative product or innovative service; even though they have already gone through an initial screening to be there, there is something missing in their business structure to know where they want to get, who are their competitors, how to set objectives and performance indicators, such as competitive advantage, to justify the need for strategic capacitation. In the same line of reasoning, there is the need to position properly their product or service in the market and, thus, in these circumstances, the training in marketing and sales areas as well as participation in trade fairs and events is strongly justified.

About participation in fairs and events, it is important to note that this activity is characterised as one of the critical success factors of the incubation process in this article. When a company goes to this type of event, they are testing products, services and skills in the market, so that they can compare themselves to their competitors and verify whether there is a need for adjustments in their marketing strategies. Unfortunately, in Brazil, the percentage of incubated companies participating in trade fairs and events throughout the incubation process is small, only 5.2% according to data from the Ministry of Science, Technology and Innovation (MCTI, 2014).

In the third or fourth position are training needs linked to finance/accounting and quality, considering the range of the true population mean. First, it is interesting to note that the most reported item by the entrepreneurs was tax burden, something expected in a country like Brazil, which has high tax rates and complex rules to be understood. All entrepreneurs want to better understand the operation and the framework of their companies in advance to meet the regulations of Brazilian Federal Revenue and in order not to be on the side-lines of the tax system. Second, the most usual items in the finance and accounting area are cost analysis, cash flow, return on investment and contribution margin.

For the quality criteria, one of the greatest needs noticed was related to standards and certification, given that a lot of companies in Brazil need to fulfil requirements to get into certain markets. Of course every company has specific certification needs, but what is being discussed here is the understanding of what is the requirement; how to develop a procedure, a work instruction, a quality policy; and how to manage documents, manuals and records, among others. Performance indicators to quality, organisation of the company, and tools and methods to solve problems were also noticed by the authors.

In the fifth, sixth, or seventh positions are the training needs linked to human resources, operations and innovation, considering range for the true population means. For the human resources, one of the greatest needs is to understand and improve relationships between entrepreneurs and their employees. These relationships are often critical due to a lean structure that leads to overloading of functions, inconsistencies and employee dissatisfaction. Entrepreneurs also indicated high necessity for technical expertise in recruitment and selection, performance evaluation and employees motivation, something slightly used but extremely important for the company's success.

With respect to the operations area, the greatest need is linked to customers' requirement because as reported by many entrepreneurs it is difficult to 'translate' the market ideas into operations vision. We clearly identified the need for tools like Quality Function Deployment, which despite being between quality and operations areas, would be of great value to entrepreneurs. Another need pointed out was the preparation and understanding of the performance indicators for operations and how they should be linked to strategic performance indicators, showing a gap in the ability to determine the right way to dismember strategies into performance indicators. They also mentioned in this main area the optimisation of operational activities and production of goods and services.

As for training in innovation, according to the authors of this paper, it is important that it must be done only if the company has a minimal managerial capacity. With this minimal managerial capacity, it is possible to approach company and ask them to invest funds, teach management innovation and make companies more attractive to investment funding organisations. If this type of training is done without managerial structure, the incubated companies can take precocious decisions about seeking fund investments and perhaps losing opportunities. This was observed in the sample of companies.

Finally, in eighth position are the training needs linked to complementary training. For this, we did not present the 20 topics, unlike in other areas. In this case, entrepreneurs could say freely what was necessary for their company. There were 80 different types of responses, but what stood out most was that 12% of entrepreneurs had questions about the business incubators' role and how they could take full advantage of all collaboration efforts being offered. We consider this topic extremely important and, for this, we decided to add in the model proposed at least two types of training, one associated with the business incubator role early in the process, and another related to its role after the incubated company goes to the market.

4.2 Model for managerial training of newly incubated companies

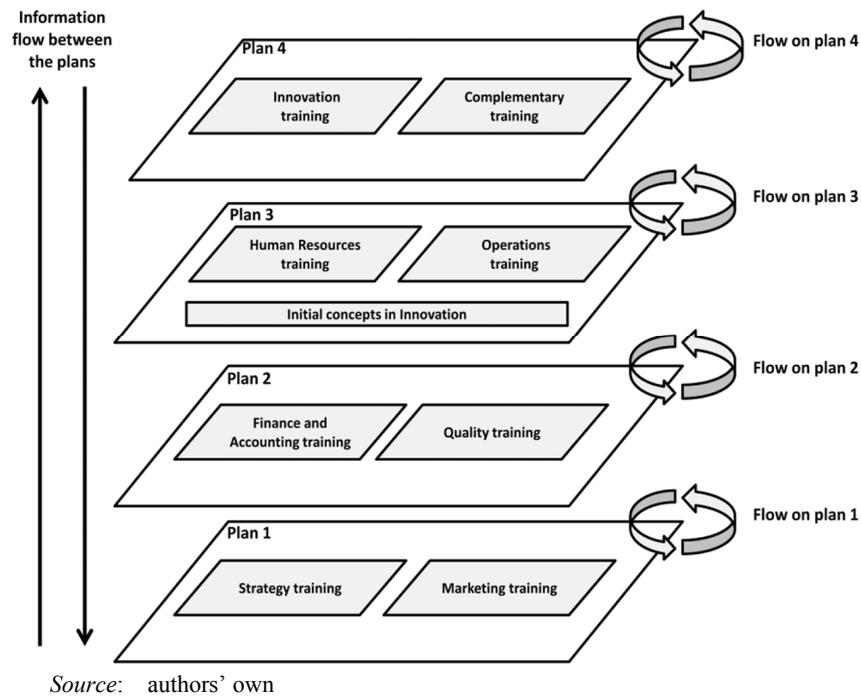
The information gathered in the previous section is the basis for the proposed model elaboration, entitled as a 'Model of four plans to capacitate newly incubated companies.' The idea of using the word 'plan' lies in the concept that knowledge is being formed and solidified with overlapping knowledge in several areas and that way the knowledge acquisition of the entrepreneur throughout their life will never be complete because there is always something that can be overridden or updated. Thus, the plan in the first or fourth position presents logic for efficiency training purposes, but for the entrepreneur what should emerge after the training is the existence of a single plan with all knowledge incorporated into it. Note also that the flow of information takes place in each one of the four plans and between the plans from top-down and bottom-up.

Regarding time, the model predicts that the implementation of training in managerial areas lasts for 2 years, divided into four semesters. The choice of 2 years coincides with the average incubation time used by most companies and follows the recommendations of the Ministry of Science, Technology and Innovation of the Brazilian Government.

In each semester, or plan, as we call here, training should be carried out in two managerial areas and each one should be given 30 hours of training and 20 practical hours, totalling 50 hours in the theme and 100 hours in the plan (considering H1, H2 and H4). As noted, the plan three presents 20 additional hours because it brings out the initial concepts in innovation. The concepts of innovation will be better developed in plan four.

The theoretical training should cover the topics presented in Table 2, and the practice hours must encourage entrepreneurs in the developing activities based on the reality of their companies. All activities developed in a practical way should be presented in the form of seminars to other members of the incubator, thereby stimulating information exchange, experience and knowledge (considering H1). Figure 5 illustrates graphically the assumptions initially set for this model.

Figure 5 Model of four plans to capacitate newly incubated companies



The model starts with three activities, training on the business incubators role and their functions, the presentation of each company and the first experience exchanges and the initial company assessment by the business incubator manager. These three activities together form the 'base plan' as designated by the authors of this article.

The training on the business incubators role will be done in 10 hours, and it will present all activities and services provided by them. As noted in the survey that preceded the development of the model, many entrepreneurs, despite going through the screening

and selection process, did not yet know all the activities offered and how they could use business incubators for achieving business success. We also recommend that in this training the business incubators managers invite companies that have gone through the incubation process in previous cycles to speak of their experiences.

In the second phase, totalling 6–10 hours, each company must make its first presentation to the business incubator members, trying to show the difference of its product/service and the company. It is hoped that with this type of presentation the company starts correcting positioning errors and enhance the earning ability of its sales pitch (considering H2).

This introductory phase ends with the company assessment by the business incubators managers. In this assessment, they must provide a grade to each of the eight managerial areas reported, this grade being assigned after interviews and audits at the companies. Besides, the incubator manager will analyse the entrepreneurial skills gaps and help each company. The same procedure should be done twice more along the model, after a year, and at the end of the incubation program, to evaluate the aggregate contribution to the companies (considering H3).

In the first plan, the formations are developed related to managerial areas of strategy and marketing, and they must be taught in order to interact with each other. As an example, we can mention the correlation between some subjects, such as competitive advantage, market analysis and issues associated with the product, price, place and promotion. Another example is listening to the customer voice and at the same time defining the company's operations' core, which when jointly work can provide synergy. Here we recommended that the company define its first goals and its first performance indicators to be followed by the business incubator manager throughout the program. This first plan meets the initial needs of newly entering entrepreneurs.

Six months later, the second plan starts, in which the formations related to finance/accounting and quality are developed. Although it is the second plan, there is already an initial base, and its concepts can and should be used here. An interesting point of this second plan is that quality and finance training provided at the same time complements both but also features aspects of competition as viewed by entrepreneurs. For example, spending on certification and training (common in quality) may be seen as cost by some employers and not as an investment. It is the function of two managerial areas to interact with each other and nullify these differences.

After the conclusion of this second plan, companies should be assessed by the incubator manager, in which comparisons will be established in eight managerial areas between the current grades and those set forth a year ago. Also will be analysed is progress in terms of entrepreneurial skills. This activity is important for the manager and entrepreneurs to correct possible problems in the companies (considering H3).

The third plan includes training related to initial concepts on innovation, human resources and operations. As training in innovation could be applied in the third or fourth plan based on the survey data, the authors of this paper chose to start the presentation on innovation concepts in the third plan and detail them in fourth plan.

For the training in human resources and operations, as occurred in the second plan, the activities complement and compete with each other in the entrepreneur's view. It is common in micro and small enterprises the existence of a lean work structure causing

employees to perform multiple tasks and putting pressure on the employees to further improve their operations. However the entrepreneur cannot forget that each employee has skills for certain activities and is more productive if correctly allocated. Likewise, it is necessary to recruit and select correctly for the operations to succeed and, thus, meet customers' needs successfully. Thus, the two major areas must work together in order to explore most of their concepts. It is noted additionally that many Brazilian incubators assist their companies in recruitment and selection of employees, a practice we considered as positive.

Finally, the fourth plan brings more activities related to training in innovation and complementary aspects. The innovation training will ensure the company's survival in the long term because once the first managerial training cycle concludes and fills the gaps, allowing the company's first entry into the market, the launch of new products or services and innovation will be needed. We believe that for incubated companies, this renewal cycle ranges from 2 to 4 years, depending on the characteristics of their products. As an example, software companies can be mentioned, whose need for renewal occurs on average every 2 years and industrial supply companies need an average of 4 years.

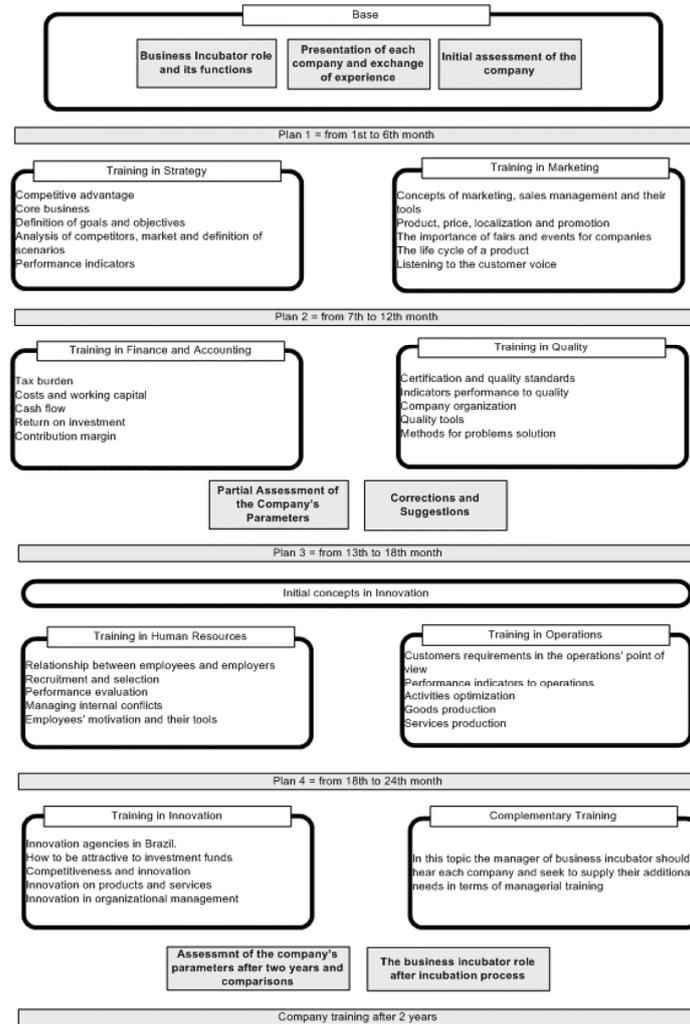
The innovation training presented in the fourth plan does not purport to be complete in respect of transfer of full knowledge of the area but only intends to alert micro and small entrepreneurs who are about to leave the incubators to the constant need to be innovative. As a result, the topics presented are generic and aim to inform entrepreneurs about sources of information related to innovation. The topics covered in this item are innovation agencies in Brazil, how to become a company attractive to investments funds, competitiveness, product innovation and innovation in organisational management.

The training in complementary aspects is presented more openly and characterised as an opportunity for entrepreneurs seeking managerial knowledge that in their opinion was not supplied by this managerial training model. The idea is that the incubator manager analyses each company separately, and through of 2 hours complementary training understand what is necessary. More important, punctual and specific questions of each company can be addressed throughout the incubation program by consultants.

Upon the conclusion of the fourth phase of training, the incubator manager will reassess the companies in eight managerial areas and entrepreneurial skills, to determine their evolution over the past 2 years, through comparisons between assessments and analysis of performance indicators outlined in plan one (considering H3). The managerial training model for incubated companies is finished with a final training in which the business incubator manager will clarify its role after the end of the incubation program.

It should be noted that after the end of the program we saw the emergence of positive outlook towards maintaining the relationship between companies and the business incubator. It is also expected that with this training model, companies will gain basic knowledge in each of the eight managerial areas and establish what we call a single plan of knowledge, composed by the overlapping of all previous plans. Figure 6 shows a summary of all the explanations provided.

Figure 6 Detailing of model proposal of four plans to newly incubated companies training



Source: authors' own

5 Conclusion

Based on the items discussed previously, this article sets out four main conclusions related to the following points: the importance of business incubators in the formation of micro and small businesses; deficiency of new entrant companies in the incubation program in relation to managerial training; types of required training; and the proposal of a training model that is characterised as the main theme of this article.

First of all, it becomes clear the incubators' play an important role in the development of a country and in a company's success. Data from the Brazilian Micro and Small Business Support Service (SEBRAE, 2013) shows that the mortality rate for companies that go through the incubation process is four times smaller when comparing to

companies that directly enter in the market. As seen earlier, the incubator allows the maturation of the company not only in terms of its products or services but in terms of managerial aspects as well.

It was evidenced by the results of this article, however, that even the company going through a selection process, there are still many gaps to be filled from the managerial point of view. For the sample analysed, the authors of this paper observed that the 156 micro and small business entrepreneurs analysed present training needs in strategies and marketing (first or second position); finance/accounting and quality (third or fourth position); human resources, operations and innovation (fifth, sixth, and seventh position); and complementary training (eighth position). It is also possible to conclude from the results that the incubator manager should always make clear the possibility of assistance because some micro and small entrepreneurs are unaware of the full potential of these assistance agencies.

We also observed, specifically in each of the eight managerial areas, the five most relevant topics for micro and small employers and found that the understandings of some of them can be considered critical success factors for these companies. We highlight as the most relevant topics the correct core business definition; the importance of participation in trade fairs and events; understanding the tax burden; the adequacy of standards and certifications; issues related to recruitment, selection and evaluation of employees; translating customer requirements to the requirements of operations; and how to become an enterprise attractive to an investment fund.

Finally, in relation to the proposed incubated companies training model, we believe that the form presented proves to be the most suitable for managerial knowledge capacitation, since the analysis relies on information gathered through survey 156 newly incubated companies and literature concepts. It is important to say that although the four hypotheses based on the literature were considered in the proposed model, proof will emerge only during the implementation of the model in the next year. Some points are worth highlighting in relation to the proposed model: the constant flow of information within and between plans, balance between theory and practice leading to companies' development, and the possibility of conflicting topics in the entrepreneurs vision to be resolved by instructors, such as whether to treat quality programmes as a cost or an investment.

The model in question is now under implementation and outcomes associated with this new phase and the training provided to the companies could be evaluated within 2 years, which entails a second publication to discuss the final results. We are available to the academic community for questions, clarifications and presentations of any other results not discussed in this article.

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Appendix 1: Questionnaire used for the survey data

Company data

Name:	Address:
Phone:	e-mail contact:
Business classification:	Economy sector:
Level of education:	Company age:

Analysing gaps in managerial needs

What are your greatest needs for managerial training? Indicate your needs using the scale from 1 to 10, considering 1 to 'without necessary' and 10 to 'extremely necessary'

Finance and Accounting	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()
Marketing	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()
Operations	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()
Quality	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()
Strategy	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()
Innovation	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()
Human resources	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()
Complementary	1()	2()	3()	4()	5()	6()	7()	8()	9()	10()

For each area, mention five topics related to your needs

Finance and accounting References: Minna (2014); Gitman and Zutter (2011); Darcy et al. (2014); Schmidt et al. (2007)	<input type="checkbox"/> Cash flow <input type="checkbox"/> The financial structure of a company <input type="checkbox"/> Breakeven point <input type="checkbox"/> Contribution margin <input type="checkbox"/> Administration of financial cycles <input type="checkbox"/> Return on investment <input type="checkbox"/> Administration of accounts payable <input type="checkbox"/> Administration of accounts receivable <input type="checkbox"/> Tax burden <input type="checkbox"/> Types of investments	<input type="checkbox"/> Risk assessment on investments <input type="checkbox"/> Financial demonstrations <input type="checkbox"/> Principal authors in finance and accounting <input type="checkbox"/> Costs and working capital <input type="checkbox"/> Sourcing strategies <input type="checkbox"/> Analysis of profitability <input type="checkbox"/> Sources and uses of funds <input type="checkbox"/> Concept of business, society and organisations <input type="checkbox"/> The property and its key elements <input type="checkbox"/> Theory of debit and credit
Marketing References: Gilmore (2011); Gilmore, Carson and Grant (2001); Pickernell et al. (2013); Maire, Bronet and Pillet (2008); McLarty (1998); Lopez-Bonilha and Lopez-Bonilha (2014)	<input type="checkbox"/> Product, price, place and promotion <input type="checkbox"/> Market segmentation <input type="checkbox"/> Concepts of marketing, sales management and their tools <input type="checkbox"/> Market positioning <input type="checkbox"/> Customer satisfaction <input type="checkbox"/> Principal authors in marketing <input type="checkbox"/> Benchmarking <input type="checkbox"/> Listening to the customer voice. <input type="checkbox"/> Publicity <input type="checkbox"/> Product characteristics	<input type="checkbox"/> Fair price <input type="checkbox"/> Client types <input type="checkbox"/> The importance of fairs and events for companies. <input type="checkbox"/> Demand and supply <input type="checkbox"/> Analysing the differences in their product <input type="checkbox"/> Basic statistic for marketing <input type="checkbox"/> Marketing research <input type="checkbox"/> Consumer behaviour <input type="checkbox"/> The life cycle of the product <input type="checkbox"/> Marketing environments

Appendix 1: Questionnaire used for the survey data (continued)

<p>Operations References: Löfving, Säfsten and Winroth (2014); Poolton <i>et al.</i> (2006); Rymaszewska (2014); Slack, Chambers and Johnston (2009)</p>	<p><input type="checkbox"/> Customers requirements in the operations point of view <input type="checkbox"/> The function of production <input type="checkbox"/> Goods production <input type="checkbox"/> Services production <input type="checkbox"/> Demand Forecasting <input type="checkbox"/> Production strategies <input type="checkbox"/> Process control <input type="checkbox"/> Activities optimisation <input type="checkbox"/> Inventories <input type="checkbox"/> Productive capacities</p>	<p><input type="checkbox"/> Maintenance of equipment <input type="checkbox"/> Reliability of production systems <input type="checkbox"/> Lean production <input type="checkbox"/> Performance indicators to operations. <input type="checkbox"/> Principal authors in operations management <input type="checkbox"/> Process flow <input type="checkbox"/> Clusters <input type="checkbox"/> Planning of manpower and equipment <input type="checkbox"/> Layouts <input type="checkbox"/> Production and human resources</p>
<p>Quality References: McAdam (2000); İlkay and Aslan (2012); Psomas, Fotopoulos and Kafetzopoulos(2010); Pyzdek and Keller (2012)</p>	<p><input type="checkbox"/> Quality tools <input type="checkbox"/> Safety at work <input type="checkbox"/> Company organisation <input type="checkbox"/> Social responsibility <input type="checkbox"/> Basic tools of statistical <input type="checkbox"/> Systemic view <input type="checkbox"/> Certification and quality standards <input type="checkbox"/> Topics on ISO 9001 <input type="checkbox"/> Topics on ISO 14001 <input type="checkbox"/> Customer satisfaction</p>	<p><input type="checkbox"/> Quality documentation <input type="checkbox"/> Performance indicators to quality <input type="checkbox"/> Prevention tools <input type="checkbox"/> Quality function deployment <input type="checkbox"/> Methods for solution problems <input type="checkbox"/> Principal authors of quality <input type="checkbox"/> Quality in service <input type="checkbox"/> Quality and reliability <input type="checkbox"/> Calibration of instruments <input type="checkbox"/> Continuous improvement</p>
<p>Strategy References: Wagner and Paton (2014); Tetteh and Burn (2001); Wincent (2005); Hudson, Smart and Bourne (2001). Guo and Cao (2014)</p>	<p><input type="checkbox"/> Definition of goals and objectives <input type="checkbox"/> Company view <input type="checkbox"/> Company mission <input type="checkbox"/> External environment analysis <input type="checkbox"/> Principal authors on strategic management <input type="checkbox"/> Performance indicators <input type="checkbox"/> Strategies formulation <input type="checkbox"/> Strategies implementation <input type="checkbox"/> Competitive advantage <input type="checkbox"/> Core business</p>	<p><input type="checkbox"/> Analysis of competitors, market and definition of scenarios <input type="checkbox"/> Strategy across the enterprise <input type="checkbox"/> The business strategy and the employees <input type="checkbox"/> Trend indicators <input type="checkbox"/> Assessment of the defined strategy <input type="checkbox"/> Differences between strategic, tactical and operational planning <input type="checkbox"/> Strategies for growth <input type="checkbox"/> Strategy for survival <input type="checkbox"/> Analysis of strengths and weaknesses, opportunities and improvements <input type="checkbox"/> Critical success factors</p>
<p>Innovation References: Gardet and Mothe (2012); Minna (2014); McAdam, Reid and Shevlin (2014); Maital and Seshadri (2013) Biancolini, Macari and Pereira (2013)</p>	<p><input type="checkbox"/> Innovation strategy <input type="checkbox"/> Integrated management of innovation <input type="checkbox"/> Innovation agencies in Brazil <input type="checkbox"/> Innovation and sustainable development <input type="checkbox"/> Competitiveness and innovation <input type="checkbox"/> Sectorial innovation <input type="checkbox"/> Types of innovation <input type="checkbox"/> Key factors in managing innovation <input type="checkbox"/> Principal authors in innovation management <input type="checkbox"/> Alliances for innovation</p>	<p><input type="checkbox"/> Approach with research centres and universities <input type="checkbox"/> Innovation models <input type="checkbox"/> How to be attractive to investment funds <input type="checkbox"/> Patent <input type="checkbox"/> Technological projects <input type="checkbox"/> Innovation on products and services <input type="checkbox"/> Knowledge for Innovation <input type="checkbox"/> Economic evaluation of technology <input type="checkbox"/> Innovation in organisational management <input type="checkbox"/> Decision-making innovations</p>

Appendix 1: Questionnaire used for the survey data (continued)

Human resources References: Doherty and Norton (2013); Zheng, O’Neill and Morrison (2009); Bond and McCracken (2005); Mathis and Jackson (2010)	<input type="checkbox"/> Organisational culture <input type="checkbox"/> Performance evaluation <input type="checkbox"/> Human resources structure <input type="checkbox"/> Managing internal conflicts <input type="checkbox"/> Principal authors on human resources <input type="checkbox"/> Relationship between employers and employees <input type="checkbox"/> Management of individual competencies <input type="checkbox"/> Management of group competencies <input type="checkbox"/> Market and human resources <input type="checkbox"/> Change scenarios in human resources	<input type="checkbox"/> Recruitment and selection <input type="checkbox"/> Life quality in organisations <input type="checkbox"/> Stress in organisations <input type="checkbox"/> Remuneration <input type="checkbox"/> Employees’ motivation and their tools. <input type="checkbox"/> Assessing skills and abilities <input type="checkbox"/> Human resource planning <input type="checkbox"/> Selection through skills <input type="checkbox"/> Challenges in human resources <input type="checkbox"/> Integration of the company
Complementary	Write here the additional needs in terms of managerial training.	
