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Impact of Business Incubation: Capacities of Post-Incubated Enterprises and Non-Incubated Enterprises

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The business incubators have been considered one of the means for Technology Based Enterprises (TBE's) to achieve a level of development that ensures, after the incubation period, their survival and progress on the market. Nevertheless, few studies were made in Brazil to determine if the objectives for which the incubators were created are being achieved and at what degree. This article evaluates the impact of incubation, measuring the development of organizational capacities in three dimensions: innovation, financial solidity and managerial abilities. These dimensions were measured in sixteen TBE's of the Informatics sector of the Brazilian state of Rio Grande do Sul. The enterprises were divided into two groups with similar characteristics: one group of post-incubated enterprises and one group of non-incubated enterprises. The method used was the study of multiple cases in a quasi-experimental design. The analysis of the data revealed that using U Mann Whitney there were no significant differences between the two groups of enterprises. However, the enterprises post-incubated demonstrated to be more innovative and to have more educated managers; although, they have a lower financial solidity.

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Abstract

The business incubators have been considered one of the means for Technology Based Enterprises (TBE´s) to achieve a level of development that ensures, after the incubation period, their survival and progress on the market. Nevertheless, few studies were made in Brazil to determine if the objectives for which the incubators were created are being achieved and at what degree. This article evaluates the impact of incubation, measuring the development of organizational capacities in three dimensions: innovation, financial solidity and managerial abilities. These dimensions were measured in sixteen TBE´s of the Informatics sector of the Brazilian state of Rio Grande do Sul. The enterprises were divided into two groups with similar characteristics: one group of post-incubated enterprises and one group of non-incubated enterprises. The method used was the study of multiple cases in a quasi-experimental design. The analysis of the data revealed that using U Mann Whitney there were no significant differences between the two groups of enterprises. However, the enterprises post-incubated demonstrated to be more innovative and to have more educated managers; although, they have a lower financial solidity.

Introduction

Business incubators are widely believed to be an ideal habitat for new Technology Based Enterprises (TBE´s). Incubators offer shared facilities that provide to be TBE´s technological and organizational resources that help them to acquire the innovative, financial and managerial capabilities that enable them to survive in highly competitive markets. Since TBE´s are a great motor of economic development by their pervasive influence in all sectors of modern life, they deserve governmental support. These rational have been the basis for governmental programs that have fostered the growth of the number of incubators in European and American countries including Brazil.

However, many authors such as Phan, Siegel and Wright (2005), Sherman (1999) and Colombo and Delmastro (2002) pointed out the scarcity of conclusive studies about the effectiveness of incubators. Colombo and Delmastro (2002) made a large study comparing forty five TBE´s located on an incubator with equal number of TBE´s off-incubator in Italy. They found that innovative activity is only marginally different between on and off incubator firms. However on-incubator firms showed better human capital, and higher rate of growth than off-incubator firms which could be explained by the incubator´s selection process. Therefore, they shed doubts about the effectiveness of incubators and justification of governmental policies favoring incubators.

This article returns to the question of the effectiveness of business incubators presenting a study that compared the innovative, financial and managerial capabilities, of eight enterprises that went through the process of incubation (post-incubated) and eight non-incubated enterprises in Southern Brazil.

1. Methodology

This exploratory study that aims to evaluate the impact of incubation process in the development of capacities in Technology Based Enterprises (TBE´s) is a multiple case study in a quasi-experimental design.

The impact of enterprises´ incubation acts as an independent variable or experimental treatment. The post-incubated and non-incubated TBE´s are the units of analysis. The innovation capacities, financial and managerial, are the dependents variables.

The TBE´s were chosen from the informatics sector and had similar characteristics regarding to: type of business, creation time, size in relation to its annual gross income and number of employees. The enterprises are established at the metropolitan region of Porto Alegre, Brazil. These TBEs have been divided in two groups of eight enterprises: one is formed by eight post-incubated enterprises (Experimental Group) that entered in four different incubators in the year of 2000 and left in the year of 2002 or 2003, and a second one formed by eight enterprises also created around 2000 that did not go through the incubation process (Control Group).

The data collection was made in two phases: the first one through interviews with the main partner of the enterprises using open questions to contextualize the situation of each business. The second phase was by the use of a closed questions questionnaire filled by the owner, partner or main director of the enterprise. The indicators concerned to the innovative, financial and managerial capabilities are those presented on the tables 1, 2 and 3.

U Mann-Whitney test was applied on each dimension indicator to establish the statistical significance of the difference between the two groups. A level of significance equal to 0,05 was used, values of U Mann-Whitney below 0,05 were considered statistically significant.

2. Results

2.1 Dimension: Innovation

The main characteristic of TBE´s is to produce new products and services that are able to fulfill and create new market needs. Incubators due to their intimate relationships with knowledge producing institutions are supposed to provide the ambiance needed to stimulate the TBE´s innovative capabilities.

Among the two groups of enterprises, the non-incubated are the ones that commercialized more products and services since their creation, totalizing 87 products and services, from which 55% are products. On the other hand, the group of pos-incubated enterprises has a total of 71 products and services commercialized, from which 60% are products. This better performance by the non-

incubated is due to the fact that they began their activity with a product ready to be sold, what did not happen in the post-incubated that were created and had a period of time to develop their products.

Table 1 shows that the non-incubated enterprises have commercialized a larger number of products and services but they are mostly improvements of already existing products. Meanwhile, the post-incubated enterprises have a three times larger number of new products, that are put in market in less time, than the non-incubated enterprises.

Table 1 – Performance in the Innovation Dimension of Post and Non-incubated Enterprises

Indicators	Post-incubated			Non-incubated			U* of M-W	P**
	Total	Average	%	Total	Average	%		
Products and services commercialized	71	8,88	-	87	10,88	-	0,505	0,211
Products already existing in the market w/ smaller cost	9	1,13	21%	16	2	33%	0,645	0,097
New version of existing products	20	2,5	47%	27	3,38	56%	0,505	0,480
New products in the market	14	1,75	33%	5	0,63	10%	0,574	0,360
Products or services developed in the last three years	22	2,75	-	19	2,375	-	0,645	0,480
Average time of development in months	-	10,36	-	-	12,77	-	0,867	0,323
Products or services commercialized in the last three years	16	2	73%	13	1,63	68%	0,442	0,439
Income from new products developed	-	65%	-	-	33%	-	0,234	0,164
Relationships w/ other institutions for product development	23	2,88	-	17	2,13	-	0,574	0,480
Percent of expenses in the development of new products over total expenses from which:	-	29%	-	-	21%	-	0,130	0,221
Expenses with R&D	-	37%	-	-	43%	-	0,574	0,221
Expenses with equipments and technology acquisitions	-	24%	-	-	11%	-	0,382	0,339
Expenses with consultancy and advisory	-	3%	-	-	14%	-	0,007	0,001
Expenses with services (use of laboratories)	-	18%	-	-	22%	-	0,382	0,164
Expenses with commercialization	-	18%	-	-	11%	-	0,645	0,520

Significance level 0,05

* $U > 0,05$ not significant

** $p > 0,05$ not significant

As a result of the smaller time of development and the greater number of developed and commercialized products in the last three years, the percentage of average income due to new products in the group of post-incubated enterprises is almost twice as big as of the non-incubated enterprises.

In what concerns the expenses on the development of new products, the group of post-incubated enterprises expends more of the total expenses, than that of the non-incubated group, but the post incubated enterprises, by having a more efficient process of innovation, expends less with R&D and more with acquisition of new equipments and marketing.

As it is observed in the results of Table 1, the only difference statistically significant in the innovation dimension is in the indicator consultancy and advisory expenses (0,007), being this service the one where the non-incubated enterprises destine a bigger percentage of their expenses. This is explained by the fact that the post-incubated, during the incubation period, have received these services with a smaller price or, in some cases, subsidies in their totality.

The results are an evidence of the more innovative capability developed by the enterprises that went through the incubation process, although the very strict demands of the statistical test used pointed out that there is no significant difference between the two groups.

2.2 Dimension: Financial

One of the main causes of TBE's mortality is the lack of ability of the entrepreneur on dealing with a business which is a high risk investment within an environment of small availability of venture capital. The incubator is supposed to provide the consultancy that help entrepreneur to manage the financial aspects.

Table 2, shows that in both groups, after 4 years of existence, seven among 8 enterprises already have a regular income, but on the average the groups have greater income than expenses.

Concerning the relation income X expense it is important to notice that within the post-incubated group there is one enterprise with the income smaller than the expenses, while in the non-incubated group none enterprise has less income than expenses.

Table 2 – Performance in the Financial Dimension of Post-incubated and Non-incubated firms

	Post-incubated		Non-incubated		U*of M-W	P**
	Total	Average	Total	Average		
Income / Expenses	-	1,37	-	1,45	-	-
No. enterprises possessing a monthly regular income	7	-	7	-	-	-
No. enterprises in debt	3	-	2	-	-	-
Debt / Income	-	2,5	-	1,5	-	-
Percentage of sales and services income of new products	-	66%	-	33%	0,234	0,164
Annual gross income						
Less than R\$ 450.000	6	-	4	-	-	-
R\$ 450.000 – R\$ 2.150.000	2	-	2	-	-	-
More than R\$ 2.150.000	0	-	2	-	-	-
Enterprises that received financial resources	4	-	0	-	-	-
No. of participations in fairs	20	2,5	4	0,5	0,038	0,117
Enterprises that made a business plan	7	-	6	-	-	-

Significance level 0,05

* $U > 0,05$ not significant

** $p > 0,05$ not significant

In the post-incubated group there are three enterprises that possess debts that are equivalent to two, five and 0,5 months of the income. In the non-incubated enterprises only two of them possess debts that are equivalent to one and two months of income. The data above shows that the group of post-incubated enterprises it is the one with more debts, either in enterprises number or in debt value (Table 2).

As it is observed in Table 2, the group of post-incubated enterprises have 66% of its income from new products, while in the non-incubated group the percentage of income originated from new products is of 43%. However, the total income of the non-incubated enterprises is higher than the income of post-incubated enterprises, which shows that even if the post-incubated enterprises have more innovative products, the non-incubated enterprises are able to sell more and make them grow faster.

In what concern external financial resources received by the enterprises, 50% of the post-incubated group had access to funds of institutions as SEBRAE and Finep during the incubation. According to Hacket and Dilts (2004) the incubators facilitate the access to credit, because investors are more confident on investing in incubated enterprises. It is emphasized that none of the non-incubated enterprises have had financial support.

The participation on fairs and events are supposed to provide identification of new clients and sales of products. In the case of the post-incubated group its higher frequency on fairs did not influenced its financial performance although it could provide the identification of new suppliers, visibility of the enterprise in the market and partnerships of technical type for product improvement, which was important for its innovative capability.

The elaboration of a business plan is frequent among post-incubated enterprises and also non-incubated enterprises. Therefore, the business plan seems to be a requirement of the highly technological sector with small influence on the differences of the financial performance of the TBE's.

Even if there are differences between the groups, these are not considered statistically significant. However it identifies that the group of non-incubated enterprises has a more stable financial situation, with a better relation between income and expenses, a smaller debt level and a better trajectory of small to medium sized business according to its annual gross income.

2.3 Dimension: Managerial Capacity

The third dimension of analysis refers to the associate's managerial capacity. It is assumed that age and level of education and specific training in administration influence the managerial performance of the managers.

Table 3 shows that in both the managers are on the average of the same age, but there is more differences regarding to the level of education, in the post-incubated enterprises there are more partners with graduate degrees.

Table 3 – Managerial Capacity Performance Comparatively to the Average Performance of the Post and Non-incubated Enterprises

Indicator	Post-incubated			Non-incubated			U* of M-W	P**
	Total	Average	%	Total	Average	%		
Age of partners (years)	-	30,46	-	-	31,94	-	0,505	0,221
Partners with a university degree	22	-	100%	13	-	68%	0,195	0,360

Partners with and specialization diploma	3	-	14%	3	-	16%	-	-
Partners with a Masters concluded or concluding	8	-	36%	0	-	0%	-	-
Partners with a Doctor degree or achieving	1	-	5%	0	-	0%	-	-
Average partner's professional experience prior to the creation of the enterprise.	58,73	7,34	-	-	7,77	-	0,959	0,520
No. relationships established w/ academic institutions	70	8,75	-	7	0,88	-	0,015	0,019
No. of training hours in administration/year received since the enterprise creation	314	39,25	-	85,67	10,71	-	0,574	0,360
Diagnosis of the managerial and leadership capacities ***		25,63			24,84		-	-

* Data obtained from a self-evaluation. Scala Used:

The indicated punctuation is the average of the enterprise's managers in each item.

As it could be expected, significant difference exists between the groups regarding to relationships established with academic institutions (universities). This demonstrate the important bond between post-incubated enterprises and universities in double sense, because, not only the enterprises profit of what the universities offer, but also this enterprises transmit their knowledge to students and researchers, trying to unite academy to the practical professional life.

Since the business creation the group of post-incubated enterprises received a number of training hours four times bigger than that of the non-incubated enterprises. It is important to emphasize that most part of the training received by the post-incubated enterprises was during the incubation period, as determines it Chan and Lau (2004) that, the advantage on receiving training and advising inside an incubator is considered as an important part on the development of the intellectual capacities to the technology based enterprises.

The study included an indicator of self analysis of the managerial and leadership capacities of the associates and the self image of both groups were very similar.

As in the other two dimensions analyzed previously, there are no statistically significant differences between the two groups except for the relationships with universities.

Conclusions

The results show that the innovation capacity in enterprises that have passed by an incubation period is greater than that of the non-incubated enterprises. Because they develop products and services that does not exists in the market.

The post-incubated enterprises have a smaller financial performance than the non-incubated enterprises because the last ones, in general, maintain a product mix where some of them are innovating and others have a longer life cycle and, therefore are more rentable. On the other side, the post-incubated enterprises invest a bigger quantity of resources in the development of new products and have not yet reached the return of their investments.

Referring to the managerial capacity, the group of post-incubated enterprises has a better position, with better prepared managers with university and graduate degrees, which assures better performance on development of new products.

The data analysis revealed that the post-incubated enterprises are more innovative, in the sense of developing a greater number of products; have better prepared managers in the managerial area, and, nonetheless, they possess a smaller financial solidity. The results of this research, with its limitations of sample size and measuring instruments, showed evidence that the incubation process have not the expected impact in the development of Technology Based Enterprises.

The results of this research are not conclusive because they can not be generalized. The realization of new studies, with a bigger sample and more refined instruments, will allow for a better basis for governmental policies designed to support incubators. The main merit of this research is that effectiveness of incubators cannot be taken for granted.

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