

Accelerating Technology-Based Ventures in a University Business Incubator in Brazil: a view on methodologies and processes

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Abstract

Drawing on the analysis of a business incubator – Genesis Institute from the Pontifical Catholic University - located in Brazil, which provides resources in terms of intellectual capital and specialized services to technology-based startups, this paper aims to explore the lessons learned from structuring the building blocks of a unique methodology and process in order to accelerate technology-based ventures.

Keywords

Venture growth; business incubators; methodologies and processes for startup acceleration.

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I. Introduction

The logic that supports the growth process is based on the search for scale and scope economies, as a way to dilute operating costs, thus improving the business results. That logic began in the industrial sector in the late nineteenth century with the consolidation of Standard Oil in the United States and diversification of businesses in the chemical area, such as BASF and Bayer, in Germany (CHANDLER, 1990). This period initiated a series of innovations that have introduced new methods of production which changed the industry structure (SCHUMPETER, 1942) and gave rise to new business opportunities.

Over two centuries of several innovations, such as information and communication technologies, have promoted the emergence of new enterprises capable of creating previously nonexistent markets or reshape the structure of mature industries, through desintermediations and reintermediations of the value chain, as well as business alliances, thus creating potential opportunities for value creation (BLOCH *et al.*, 2002; ETHIRAJ *et al.*, 2001), stimulating a constant movement of births and deaths of firms, characterized by Schumpeter (1942) as a process of creative destruction - the fundamental impulse that drives and keeps the capitalist engine in operation.

We reached the "Information Age" of the global markets, where the traditional factors of production - machinery, buildings and capital - become less important than human resources and their capacity to generate knowledge and innovation, essential elements for the survival of organizations and which increasingly find themselves beyond the boundaries of the firm (CHESBROUGH, 2006). De Masi (1999) summarizes this transformation when he says "... the main production installation of the modern corporation is within the worker's head".

Accordingly, the universities in general and specifically the entrepreneurial universities became fundamental agents in this process, not only for their traditional responsibility in terms of research and education, but also for the opportunity to fortify their role in knowledge transfer and commercialization (OECD, 2001), especially through technology-based venture creation.

With a strong tradition in teaching, research and scientific development, the Pontifical Catholic University of Rio de Janeiro – Brazil - has invested in the development of an ecosystem of innovation and entrepreneurship since the mid-90s, in order to allow a more effective knowledge transfer from the University to the society. Since the creation of the Genesis Institute for entrepreneurship and innovation and the business incubator in July 1997, more than 70 new ventures have been founded by researchers, students and professors.

Drawing on the analysis of this business incubator, this paper aims to explore the lessons learned from more than a decade of supporting technology-based startups. Thus, the following research questions were established: What kind of services, from a company perspective, really creates value to accelerate the startup's sustainable growth? How can this impact be measured? What kind of metrics should be used in qualitative and quantitative terms?

This paper reports on a longitudinal analysis of more than 70 companies, a survey with numerous technology-based ventures entrepreneurs, interaction with area specialists – practitioners and academics -, as well as market information, statistics, besides firms and business incubator documents. The case method (YIN, 1994) was largely used to direct different aspects of the research analysis (EISENHARDT, 1989), and the acquired learning has been used to develop new frameworks that not only will serve as experience to practice recommendations but also to design new investigations.

II. Analytical Framework

This paper, by one hand, builds on the theoretical framework of business growth and transformation (VAN DE VEN & POOLE, 1995; DAVIDSSON & WIKLUD, 1999; MOTTA, 2000), in which the researchers worked on the understanding of the backgrounds of organizations growth in terms of causes, inducers, resources and competencies. On the other hand, the research directs its attention to the ecosystem where the ventures under study were located – inside a university business incubator in Brazil –, as described before. In this perspective, the theoretical and practical models explore the knowledge flow between universities and businesses, stimulated by the government in the form of general incentives – public policies, legislation, scholarships, taxation - and funding, contributing to promote the companies competitiveness by increasing the capacity to develop services and products based on knowledge (ETZKOWITZ, 2009).

Teece (1998) has argued that the essence of the firm is its ability to create, transfer, assemble, integrate and exploit knowledge assets. Knowledge assets underpin competences, and competences in turn support the firm's product and service offerings to the market. Competences derived from a unique combination of resources are the best way for new companies to establish initial strategies and create value in the long run (SCHUMPETER, 1942).

In its most essential form of analysis, the expansion process can be studied by means of changes in organizations, under different perspectives - strategic, structural, technological, human, cultural and political (MOTTA, 2000). A pluralistic approach to the process of change provides a greater richness for the explanations of complex phenomena such as the organizational life (VAN DE VEN & POOLE, 1995), giving rise to a more robust theoretical means with greater possibilities of empirical evidence; besides broadening the horizons of opportunities for potential units of analysis.

Understanding the process of expansion and consolidation of organizations implies studying, over time, a set of organizational changes, which alter the shape, quality or state of an organizational entity – this being is a functional area, a sales policy, a business or even the behavior of a group of employees – from “A” to another, different, set as “ γ A”, which is not necessarily characterized as larger, more suitable or more efficient (VAN DE VEN & POOLE, 1995). It is important to emphasize, for the purposes of this research, that we are interested mainly in positive events, i.e. those who actually made the business grow.

Van de Ven & Poole (1995) attempted to identify the mechanisms that generate events and referentials, called engines, which would represent the fundamental elements, functioning as a “common denominator” of the various taxonomies of change process, either in social or biological area. In this sense, they defined that the transformations which companies go through are guided under four paradigms - (1) life cycle models, in which the process of change happens according to successive and dependent stages; (2) teleological models, based on the formulation of objectives and implementation, evaluation and adaptation of these goals; (3) dialectical models, based on the confrontation of opposing entities that produce a new synthesis; and finally, (4) evolutionary models, based on repeatable processes of variation, selection and retention of events between various entities of a population.

However, the existence of "building blocks" of change is not shared by all. To Bhidé (1999), for example, the process of transformation or growth is more linked to context, internal and external, of the enterprise than to a sequence of events with pre-conceived actions a priori.

In a more empirical bias directed to the growth issue Wiklund (1998) suggests the existence of two perspectives, namely: (1) works that attempt to explain the reasons why companies grow - growth factors; (2) studies that are concerned to understand the consequences of growth - growth process.

Davidsson & Wiklund (1999), aiming at creating an appropriate methodology for the development of empirical work, with consistent theoretical background, combined some of the previous ideas taking into account the specific characteristics of small and medium businesses, and suggested the use of three distinct units of analysis: (1) individual(s); (2) activities; and (3) governance structure, which would be intimately related to the different conceptual lines of studies in the area.

In general, the success of innovative companies that explore knowledge assets and cross “the valley of death”, building sustainable competitive advantages, will contribute to the economic growth of their regions generating wealth, jobs as well as social enhancing. Some of those companies have kept a close relation with universities’ ecosystems.

The Pontifical Catholic University of Rio de Janeiro has contributed to the creation of a dynamic ecosystem in which its business incubator, in collaboration with university departments and laboratories, has worked together with the state government, the federal agency of innovation, the small business agency and many others, encourages the development of companies created as to explore their knowledge assets.

III. The case study

The Formation of the Business Incubator Ecosystem and Culture

PUC-Rio’s business incubator was created with the support of university’s outside partners such as Citibank, Sebrae¹, Softex², FINEP and FAPERJ³; i.e. since its opening it was inserted into a large network of partners consisting of entities from public and private sectors that believed in boosting entrepreneurship and innovation culture. By the same reason important departments from the university - Information Technology and Engineer -, with a strong tradition in research, also gave support to the initiative.

After five years, with consolidated actions in the technology arena, Genesis Institute (GI) has sought a new work area of enduring importance to the country’s economy: the creative industry. Once again, with the support of internal partners - Department of Architecture and Design - and some external stakeholders, the GI launched, in 2002, the first Latin American Cultural Incubator, creating another mechanism for transferring knowledge to society and extending its expertise in generating and managing of innovative businesses also to the culture field.

And to consolidate the mission of the Genesis Institute in transferring university knowledge to society, generating social, economic and human development, the Social Incubator of Communities was founded in 2004 aiming to locally strengthen communities of low

¹ Brazilian Agency for the support of Small and Micro Enterprises.

² Brazilian society for the promotion of software exportation.

³ Research foundation of the state of Rio de Janeiro.

socio-economic development, through the training of entrepreneurs and the generation of enterprises using social technologies.

Throughout its twelve years of existence Genesis entered into several networks, consortia and associations in Brazil – Redetec⁴, ReInc⁵, Anprotec⁶ – and in Latin America – RedLAC⁷, Emprendesur⁸, RELAPI⁹ –, which promoted the development of partnerships and exchanges of experiences, not only accelerating the volume of knowledge about the incubation and technology transfer process, but also providing to the incubated enterprises a range of possibilities for accessing new markets.

The resources, methodologies and processes that have been developed by the Institute were forged during its journey and resulted from its relationships with external and internal partners. The next session will identify which resources have generated substantial impacts to the incubated companies, explain why they are so distinctive and last, but not least, how these resources are combined to generate unique methodologies and processes.

Business Incubator Resources and Services

The physical infrastructure of Genesis Institute includes the Genesis building, the creativity labs and the Center for Studies and Research. The Genesis building has 895.14 square meters of constructed area, divided into 25 modules where enterprises are located, an auditorium for 30 people, 2 meeting rooms, in addition to the shared dependencies such as kitchen, bathrooms and living areas. Such infrastructure is used by resident companies of the technology incubator as well as by the operational units that provide incubation services and the administration of the Institute.

A range of specialized services are offered to enterprises, including design and marketing support, consultancy services, mentoring, strategic and financial planning, legal services, public and private fundraising advice and, through an IT platform, a personalized one-to-one diagnostics and counseling program. Because of its close relations with PUC-Rio, Genesis also offers a series of training sessions on various topics, taught by professors in the related disciplines.

Notwithstanding each one of the services and resources described above has its relevance, what really makes difference is the way they are combined, organized and applied. Each one of the companies supported by the business incubator has its own demands and features that are considered in their growth planning, and just after those have been identified a business consultant is designated to mentor the company. In other words, the consultant works as an account manager, responsible not only to orient the company, whenever the issue to be resolved can be addressed by himself, but also to recommend a specialist if it is the case.

⁴ Technology network of Rio de Janeiro.

⁵ Rede de Incubadoras, Polos e Parques Tecnológicos do Rio de Janeiro;

⁶ Associação Nacional de Entidades Promotoras de Empreendimentos Inovadores;

⁷ Red Latinoamericana y Caribeña de Incubadoras de Empresas;

⁸ Red Emprendedorismo y Innovación en América Latina;

⁹ Red Latinoamericana de Asociaciones Nacionales de Parques y Polos Tecnológicos e Incubadoras de Empresas;

Generally speaking, all the supported companies receive, at least, two hours per month of consultancy. Each consultant has to follow a general orientation program in which specific milestones should be attended during the period of incubation. The following chart shows a general plan for the first year of company's attendance.

Chart 1 – First Year Development Plan

M 1	M 2	M 3	M 4	M 5	M 6	M 7	M 8	M 9	M 10	M 11	M 12
Ev. 1 (90')	CS (60')	Ev. 2 (90')	CS (60')	CS (60')	CS (60')	Ev. 3 (90')	CS (60')	CS (60')	CS (60')	CS (60')	Ev. 4 (90')
CS (60')	CS (60')	CS (60')	CS (60')	CS (60')	CS (60')	CS (60')	CS (60')	CS (60')	CS (60')	CS (60')	CS (60')
2,5 hs	2 hs	2,5 hs	2 hs	2 hs	2 hs	2,5 hs	2 hs	2 hs	2 hs	2 hs	2,5 hs

CS: Consultancy Session; Ev: Evaluation Session.

With this kind of program, the growth process of the companies can be directed and oriented, since during a hole year a set of objectives, milestones and deadlines are determined, as well as some evaluations are established between the incubator and the company executive team.

The traditional accelerating model requires that the company be located in Genesis' facilities. In order to raise its base of customers Genesis launched a new model of relationship with companies that wanted to participate in its ecosystem and so created the PULSAR program, which allows selected companies to use some specialized services such as consultancy in the areas of strategic, legal services, financial and marketing planning as well as public and private fundraising advice. In this case the university does not have capital shares of the companies since they do not use PUC's intellectual property in terms of labs or research & development.

It is important to make clear that the university holds 5% capital shares in all incubated business since the technology from these spin-offs is co-owned by the university. Every time a company is sold, the university can return its investment and reapply the money on the university ecosystem. Therefore, the start-up companies must obtain a license on the patent or intellectual property before commercializing the technology and approaching Genesis for consideration.

IV. Results and Discussion

The following chart presents a group of selected resources and competencies that has been qualified by the entrepreneurs as the most relevant in order to underpin the companies acceleration growth. Besides that, it identifies some distinct aspects of the incubation process and the impact generated in the companies' structuring, which are directly related in terms of generated impact to people and team; company competences and assets; and governance, accordingly to the theoretical framework proposed by Davidsson & Wiklund (1999).

From a broader approach, i.e. looking at the university ecosystem, it can be noted in Chart 2 that the impact generated in companies creates positive conditions for their development. Accordingly, the impacts generated actions as originators of growth, helping to create a resource base that can be explored not only during the incubation period but in a long-

term perspective. It is important that the competencies and resources developed by the companies during the incubation period have consistence to be kept after the company leaves the incubator environment.

Chart 2 – Business Incubator Resources, Company Growth Inducers and Generated Impact

Business Incubator Resources	Actions & Activities	Generated Impact on companies
Experienced People	The incubator keeps a staff with graduation degree and experience in the support to the structuring and development of enterprises, based on knowledge assets;	Diminish fail rates; Adequate solutions for startup companies;
Incubation Process and Methodology; Information Systems	The incubator developed a proprietary methodology to select and support incubated companies that has been tested and adapted for more than a decade; Information systems that permit incubator staff, consultants and entrepreneurs to understand the company evolution, problems and necessities by comparison with a database;	Companies selected by clear criteria with focus in market, innovation and viability; Systems permit both the incubator and the entrepreneur to have updated information about company evolution;
Networking and Partnerships (national and international)	Internal connections with university departments, labs, Junior Enterprise and technology transfer office; External relationship with alumni; business angels, investors, innovation agencies and other incubators in Brazil and Latin America; Strong relationship with former incubated companies; Technology Agreements with incumbent companies;	Market access; Investors access; Labs access; Access to talented people;
Experience with implementation of Government and Multilateral Agencies supportive programs	The incubator has executed many programs for the government with high success rates: National Incubators Program, development of Technical and Economic Feasibility Studies (EVTEs), productive chains surveys, to name a few; The incubator has implemented social projects for IDB with focus in low income communities;	Increase companies success rate by the transfer of experience, technology and services; Develop partnerships that approximates Agencies and entrepreneurs creating new market opportunities;
Entrepreneurship education program and training	The university has a minor in entrepreneurship with 20 subjects and almost 1,000 students enrolled every year;	Promote innovation and entrepreneurship culture;

	Genesis organizes workshops, boot camps, presentations and forums like FOG – Genesis Opportunities Forum;	Train students, researchers and entrepreneurs; Develop talented people; Inspire PUC community to start a company;
Infrastructure and university ecosystem	The university campus is located in a pleasurable area; the entrepreneurial and innovation atmosphere; the proximity to labs and professors; the facilities to lodge the startups;	Facilitate the collaboration and ideas exchange; Improve the social capital and develop friendship; Motivate the formation of consortiums and agreements; Attract new potential entrepreneurs from university and also from outside;

The next chart explores indicators that are effects or results of the growth antecedents described in the previous table. Chart 3 lists some performance indicators from a segment of companies inside PULSAR program, described above, which permit to observe the increase from 2009 to 2010 in terms of jobs created, patents and revenues.

Chart 3 – Key Performance Indicators of PULSAR Program

Performance Indicators	2009	2010
Founders and Partners	150	157
Employees	51	106
Trainees	11	31
Scholarship	9	19
Others	66	78
Revenues	R\$ 3,693,255.00	R\$ 9,831,883.00
Deposited Patents	10	27
Patents under evaluation	21	15

The next chart presents some performance indicators from incubated companies in terms of jobs created, new services and products developed and revenues.

Chart 4 – Key Performance Indicators Incubated Companies

Performance Indicators	2009	2010
Generated products and services	153	106
Jobs	116	78
Income	R\$ 3,060,481.00	R\$ 3,424,171.20

The academic environment, by definition, favors the development of innovative technologies and differentiated business ideas. Universities with a vocation for research, such as PUC-Rio, play a key role in this scenario, since they act as important sources of assets for the society, contributing to the generation of new knowledge.

Nevertheless, in the business environment, technological innovations are related to the acceptance of solutions by the market; this way, it is the market that validates the effectiveness of the innovation process. To oxygenate their research and development and therefore their technological innovation, businesses get close to the academy to share expertise, conduct applied research, exchange experiences and expand their intellectual capital.

The charts presented above provide evidences that the university ecosystem can positively impact the companies' growth. These companies, stronger in R&D competences, generally with better competitive services and products resulted from R&D effort, generate more revenue and jobs with bigger added value rates that will contribute to the economic growth of their regions generating wealth as well as social enhancing.

V. Concluding Remarks

This paper provides evidences that some incubators can play a central actor role in the building of knowledge-based economy, supporting the growth of technology-based ventures that will help the country to have more dynamic enterprises, stronger in R&D competencies and with better chances to succeed. By one side, with a deep understanding of innovative firms demands, a good knowledge of the business environment, relationships with large companies, government, university alumni, investors and business angels and by another side understanding university's environment, connecting with labs, researchers and students, the incubator can act as a consensus space, as a mechanism to capture market demands and bring the academy inside as well as become a channel for the transfer of knowledge from academy to market.

This research presents evidence that a specialized set of resources and process combined in specialized services provided by PUC's incubator, a university with strong connections in the area of R&D, as well as an experienced group of consultants, former entrepreneurs, mentors, support networks, among other resources, make a difference for the technology-based companies' growth.

The availability of accessible research laboratories and highly qualified staff combined with the dissemination of an entrepreneurial culture encourages the community connected to

the university not only to take their ideas off the paper, but provides facilitating mechanisms to do so – such as an incubator, a technology transfer office, and an organized network of angel investors and mentors - which can positively impact in the development of a valuable resource base for creating competitive advantages.

As can be seen, although the infrastructure near the university is a prominent element in the perception of entrepreneurs, it is a human aspect (intellectual capital) the main element of success in the words of the entrepreneurs themselves. Even for the infrastructure it is clear that proximity and coexistence catalyze the sharing of problems and solutions, creating a collaborative environment which provides high levels of social capital.

Different mechanisms – such as angel investors, business roundtables, mentoring, and technology cooperation agreements – assist the processes of entering the market, generating of knowledge, organizational structuring, generating assets that will ultimately reduce the shortcomings of scale and scope in a more accelerate pace.

The incubator believes that the closer to companies' problems and demands, the easier to identify and understand cause and effect relations of the specialized services and growth impacts. The incubator has used this knowledge to customize and offer new services, to enhance its infrastructure and also improve its selection criteria in order to have better candidates that will benefit more from its resources. The idea is to improve the incubation process on a regular basis.

Finally, we perceive that the impacts caused by the ecosystem in the incubated companies are well understood; however, the mechanisms to measure the results obtained from these impacts are still in need of improvement. Mechanisms such as income, jobs created, deposited patents and products and services generated, although showing the evolution of business, do not show the richness of the changes occurring during the growth process of startups.

References

- Bhide, A., (1999). Building Self-Sustaining Firm. In: SAHLMAN, W. A. *et al.* The Entrepreneurial Venture. 2.ed. Boston, Massachusetts: Harvard Business School Press.
- Bloch, Michael; Pigneur, Yves; Seveg, Arie, (2002). On the Road of Electronic Commerce: a business value framework, gaining competitive advantage and some research issues. Retrieved 2002 from <http://www.haas.berkeley.edu/citm/publications/papers/wp-1013.html>.
- Chandler, A. D., (1977). The Visible Hand. Cambridge, Massachusetts: The Belknap Press of Harvard University Press.
- Chandler, A. D., (1990). The Enduring Logic of Industrial Success. Harvard Business Review, p. 130-140, March/April.
- Chesbrough, H. (2003). Open Innovation: The New Imperative for Creating and Profiting from Technology. Harvard Business School Press.
- Chesbrough, H., (2006). "Open Innovation: A New Paradigm for Understanding Industrial Innovation," in Henry Chesbrough, Wim Vanhaverbeke, and Joel West, eds., Open Innovation: Researching a New Paradigm. Oxford: Oxford University Press, pp. 1-12.
- Davidsson, P.; Wiklund, J., (1999) Theoretical and Methodological Issues in the Study of Firm Growth. Jonkoping International Business School Paper Series. Retrieved 2004 from: http://www.ihh.hj.se/eng/research/publications/wp/jibs_working_paper1999.htm.

- De Masi, Domenico, (1999). O Trabalho, segundo De Masi. Revista Inteligência Empresarial. n. 1, p. 29-36, outubro.
- Eisenhardt K. M., (1989). Building Blocks from Case Study Research. *Academy of Management Review*, v.14. n.4, p. 532-550.
- Ethiraj, Sendil; Guler, Isin; Singh, Harbir, (2001). The Impact of Internet and Electronic Technologies on Firms and Its Implications for Competitive Advantage. Retrieved 2001 from <http://www.intel.com/ebusiness/>.
- Etzkowitz, H., (2009). Hélice Triplíce: universidade-indústria-governo: inovação em ação. Porto Alegre: EDIPUCRS.
- Etzkowitz, H. and Klofsten, M., (2005). The Innovating Region: toward a theory of knowledge-based regional development. *R&D Management*, 35 (3), 243-255.
- Motta, Paulo R., (2000). Transformação Organizacional: a teoria e a prática de inovar. Rio de Janeiro: Qualitymark.
- Organization for Economic Co-Operation and Development, (2001). Journal of the Programme on Institutional Management in Higher Education. *Higher Education Management*. Retrieved 15 May 2011, from <http://www.oecd.org>.
- Schumpeter, J. A., (1942). *Capitalism, Socialism and Democracy*. New York: Harper and Row.
- Teece, David J., (1986). Capturing value from technological innovation: Implications for integration, collaboration, licensing and public policy. *Research Policy*, v. 15, p. 285-305.
- Van de Ven, A.; Poole, M. S., (1995). Explaining Development and Change in Organizations. *Academy of Management Review*, v.20, n.3, p. 510-540.
- Von Hippel, (1988). *The Sources of Innovation*. New York: Oxford University Press.
- Wiklund, J., (1998). *Small Firm Growth and Performance: Entrepreneurship and Beyond* Jonkoping, Sweden: Jonkoping International Business School, 1998. Retrieved 2004 from:< http://www.hhs.se/E/People/johanw_publications.htm>.