

Evolution of business start-ups in the South-Eastern Brazil: critical learning episodes as a theoretical and analytical tool¹

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Economic theories, such as the theory of the firm and the evolutionary economics, hold on concepts that explain the acquisition and the transformation of resources by enterprises. These theories describe a process of identification of needs, search for inputs to fulfil them, and transformation of these inputs into services for survival and growth of firms and of industrial sectors, respectively. All of them highlight the importance of learning but they do not detail how learning processes come about. Additionally, there is little attention to small scale enterprises, characterised by the scarcity of initial resources. This paper focuses on business start-ups as dynamic entrepreneurial initiatives that aim to survive and grow in the market. To the explanation of the evolution of business start-ups, it introduces the concept of critical learning episodes. Critical learning episodes are turning points in the start-up history. They are composed by three main subplots: processes of development of meaning (creation of values and culture), processes of development of commitment (networks of the start-up with partners and other actors), and processes of development of method (ways of doing things). To examine these episodes, entrepreneurs were interviewed from 44 business start-ups in South-Eastern Brazil, all enrolled in a business development service designed to promote enterprise development and growth by providing operational and strategic services at lower costs. From these start-ups, 37 are documented in this paper for the most common critical learning episode, entry and permanence in the market (n=70). This type of episode is triggered by three main needs: 1) needing to enter a well-established market; 2) needing to create a new market niche for an innovative product; and 3) needing to outlive the threats to the permanence of the business in that market. Learning strategies applied by the entrepreneurs in response combined cognitive (mainly extrinsic reflection) and behavioural strategies (remarkably practical application and interpersonal/inter-organisational help seeking). These episodes led to the creation of the identity of the firm, to reconfigurations in its network, and to the development of new methods of functioning. A number of new routines were observed in all start-ups. These routines, for instance, included developing combinations of formal and informal business transactions, producing simpler and more marketable products, establishing partnerships for research and development, developing specialised services, broadening the scope of the target market, creating spin-offs, selecting buyers, speeding up the creation of new products, defining tasks among associates, and relying on trust-based relationships with buyers. Comparisons between the initial networks and their configuration by the time of the interviews indicated the embeddedness of these business start-ups in the institutional setting provided by support institutions. To systematise the narratives into plots, the concept of critical learning episodes was a fundamental analytical tool showing that the evolution of business start-ups can be theoretically described in terms of the creation of new meanings, new commitments, and new methods. It also enabled comparisons per sub-category of market and per learning strategy, as well as the description of the evolution of the start-ups networks.

Keywords: evolution of business start-ups, critical learning episodes, learning strategies, routines, networks.

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Introduction

Business start-ups are entrepreneurial initiatives that aim to survive and grow in the market (Altenburg and Eckhardt 2006). They are dynamic organisations, constituted and structured by the access to diverse types of resources, i.e., labour, capital, supplies (Altenburg and Eckhardt 2006), and strongly dependent on strategic orientations and continuous improvement (Best 1990). However, they are characterised by high rates of failure in the first years, given the lack of access to the needed resources. In Brazil, as the most promising statistical indexes show, 78% of all business start-ups were still operating at the end of the second year, which is a percentage comparable to more developed countries such as England (82%) and Singapore (75%). This is an improvement over 2002, when only 51% of Brazilian start-ups survived their second year (SEBRAE 2007)³. In spite of the importance of this segment of the private sector for the generation of jobs and income, *how* start-ups evolve during this critical period has received little attention (Imasato 2005).

Economic theories, such as the theory of the firm (Penrose 1980) and the evolutionary economics (Nelson and Winter 1982), rely on concepts that explain the acquisition and the transformation of resources by enterprises. Briefly, these theories describe a process in which needs are identified, resources are sought to fulfil them, and these resources are transformed into services and incorporated to the enterprise functioning. They do not detail how the process comes about. Furthermore, the theory of the firm in particular is based upon complex organisations in which a managerial team deals with the issues of access and transformation of resources. The focus on a managerial team of decision makers was broadened by Best (1990), who claimed that continuous improvement and innovation depend on learning processes from any stakeholder related to the entrepreneurial firm.

Together, the theory of the firm (expanded by the new competition approach) and the theory of evolutionary economics constitute the theoretical basis of this paper at the business start-up level. At the entrepreneur level, a psychological theory of learning in organisations makes it possible to describe learning strategies applied by individuals (Abbad and Borges-Andrade 2004). The concept of critical learning episodes (Knight and Pye 2004) provides the link between individual learning strategies (Warr and Downing 2000) and learning outcomes at the start-up level. Critical learning episodes are turning points in the start-up history, which may divert the course of the business into different ways. The theoretical and analytical implications of this concept are explored here and used to explain the evolution of business start-ups. This shows how endogenous or exogenous factors trigger individual learning strategies of entrepreneurs, resulting in new organisational routines and the evolution of the start-up.

The paper is organised in four parts. The theoretical framework of the research is presented in the first three sections (evolution of small enterprises, learning in organisations, and critical learning episodes), followed by a brief methodological section and the empirical results divided in three sections (critical learning episodes, learning strategies and network dynamics). The last section concludes the paper by relating the research question with the findings, and by presenting limitations and a research agenda.

Evolution of SMEs

This section begins with the evolutionary theory of economic change (Nelson and Winter 1982) and its contributions towards explaining the evolution of business start-ups and then it moves onto the theory of the firm. The key idea of evolutionary economics is that

the condition of the industry in each time period bears the seeds of its condition in the following period. It is precisely in the characterization of the transition from one period to the

³ SEBRAE is the Brazilian Service of Support for Micro and Small Enterprises; its aim is fostering entrepreneurship and development in Brazil. It is a private entity of public interest and, as it will be shown, plays a crucial role for the business start-ups in this study.

next that the main theoretical commitments of evolutionary theory have direct application (Nelson and Winter 1982)

In spite of the fact that the evolutionary theory is concerned with the industry behaviour, it recognises the essential role played by variables from the individual firms. Its authors, for instance, refer to two different ways in which the state of the organisational knowledge can change: by deliberate choice (endogenous factors) or by non-chosen and unwelcome processes (exogenous factors). This deliberate choice is related to a search for knowledge "in a source known to contain the answer, or an extended search for a problem solution that may not exist" (Nelson and Winter 1982). Endogenous and exogenous factors together play a role in triggering change in organisational knowledge, igniting endogenous processes of learning. The concepts of search and routine in evolutionary economics are particularly relevant to learning processes.

Routines are the skills of an organization. The performance of an organizational routine involves the effective integration of a number of component subroutines (themselves further reducible), and is ordinarily accomplished without 'conscious awareness' – that is, without requiring the attention of top management. (Nelson and Winter, 1982, p.125).

Routines at the start-up level include, for instance, application of learning outcomes and the regular use of established working procedures in-house and in the inter-organisational sphere. The routinization of activity, according to Nelson and Winter (1982, p. 99) is "the most important form of storage of the organization's specific operational knowledge". The "way of doing things" is inherent to the start-up functioning, in both abstract (values, identity) and concrete terms (production system, network configuration). However, this apparent equilibrium is in constant move, with new situations requiring new solutions. A first response to a new challenge is likely to be drawn from the current routine. However, when this does not work, a new learning cycle will take place, resulting in new patterns of problem-solving that can be only vaguely identified in the outcomes of the activity. These patterns are even less clear in the changes at the firm level, since the organisational routines will incorporate only those patterns that worked effectively in the given problem-situation (Nelson and Winter 1982). Further, the section on critical learning episodes will distinguish learning outcomes from organisational routines. For now, it is important to bear in mind that the development of a start-up depends on the establishment of organisational routines and also on changes in these routines towards more advanced levels in the firm's evolution.

The second guiding concept of evolutionary economics is search. Search is defined as "a rubric for the variety of processes, mostly intentional but some not, by which rule changes take place" (Nelson and Winter 1982). Search is irreversible (acquisition or production of new knowledge usually has higher costs than its retention and use), uncertain (the exploration of available alternatives may bring up other alternatives that will increase the sense of control over the environment), and contingent (dependency on potentially available solutions in a given context).

Search can be seen as an umbrella strategy to come up with new knowledge in light of theories of learning (see details of learning processes and the relationships between search and learning in the next two sections). It is a continuously active process, particularly during the first stages of a start-up, when the organisational routines are expected to be established, tested and improved in a progressive cycle.

Narrowing down to the firm level, the theory of the firm (Penrose 1980) provides important additional assumptions to studying the growth of business start-ups. First, firms are dynamic and context-dependent units, so that past, current and expectations of future decisions shape the decision making process. Second, entrepreneurs have to go beyond the information acquisition, to include information processing, adaptation and implementation to fulfil start-up needs (Best 1990, Penrose 1980). Therefore, a) the institutional context in which the start-up is embedded, together with its current routines, is crucial to provide the resources (information and means to transform it) for the firm formation and growth, and b)

learning is a basic process to transform information into useful services for a business start-up. This brings in the two central concepts of the theory of the firm: resources and services.

Strictly speaking, it is never resources themselves that are the 'inputs' in the production process, but only the services that the resources can render. The services yielded by resources are a function of the way in which they are used [...] [R]esources consist of a bundle of potential services and can, for the most part, be defined independently of their use, while services cannot be so defined, the very word 'service' implying a function, an activity" (Penrose, 1980, p.25).

Productive opportunity, Penrose says, consists of productive opportunities that are identified and taken advantage of by any member of the organisation who has entrepreneurial contributions (new ideas for technology, management, products, raising of capital, firm expansion etc.) for the growth of the firm. Penrose (1980) focuses on the role of expert managerial teams. However, despite their general lack of managerial skills, beginner entrepreneurs learn how to acquire resources and to transform them into services for the establishment of their businesses, though not for their immediate growth. These services, then, will become available at the organisational level since they are shared with other members and incorporated to the organisational routines. This embeddedness of the new knowledge in the organisational functioning is guaranteed by institutional memory mechanisms and socialisation processes (Penrose 1980, Nelson and Winter 1982, Borges and Albuquerque 2004).

A gap not solved by the theory of the firm is the nature of the productive opportunity:

If we can discover what determines entrepreneurial ideas about what the firm can and cannot do, that is, what determines the nature and extent of the 'subjective' productive opportunity of the firm, we can at least know where to look if we want to explain or to predict the actions of particular firms (Penrose, 1980, p.42).

The productive opportunity changes with the acquisition of new knowledge, indicating that one of the learning outcomes is a change in how entrepreneurs 'read' their firms and environments before and after acting upon them. The outcomes of this acting will add to the knowledge of the organisational actors, reshaping their lenses for further 'readings'. This combination of availability of resources and the human capacities to transform them into services creates the productive opportunity of a given firm. This view of the role of knowledge, created either deliberately or through experience, has been recognised by economists, but in Penrose's words they "have, for the most part, found the whole subject of knowledge too slippery to handle with even a moderate degree of precision, and have made little attempt to analyse the effect of changes in the traditional economic variables upon changes in knowledge" (1980, p.76-77). The theoretical aspects of this issue and the empirical results will demonstrate the unfolding of learning processes towards the development of productive opportunity of business start-ups.

Learning in organisations

"Learning is what helps the firm to strike a balance between routines and creativity and the capacity to learn depends in no small way on its absorptive capacity: that is to say the firm's ability to recognize, assimilate and exploit knowledge, from within and without, is largely function of the level of prior-related knowledge" (Cooke and Morgan 1998) . This definition of learning is aligned with the economic theories discussed above, explicitly relating learning to a 'firm's ability'. In psychological studies, this is a controversial statement, since people are those who learn and this type of knowledge is an intrinsically human attribute. It requires that one defines learning, differentiates levels of learning and locates learning processes in organisational contexts.

A first overview of types of knowledge in entrepreneurial ventures by Lichtenstein and Lyons (2006) classifies these as follows:

- a) Technical: related to the operation of the core business of the start-up;
- b) Managerial: organisation and management of these operations;

- c) Entrepreneurial: identification of opportunities and actions to make use of such opportunities (closely related to Penrose's concept of productive opportunity);
- d) Personal: self-awareness, willingness to engage in entrepreneurial endeavours, emotional development, and other attitude-based characteristics.

One assumption underlying these dimensions is that they can be learned in order to improve the entrepreneur's knowledge and the start-up's performance. However, the step prior to acquiring resources and learning how to work on them is learning how to access these resources. This prior step is, in this study, represented by the learning strategies used by entrepreneurs.

Learning and learning strategies: the entrepreneur level

Learning is "a behavioural and attitudinal change which involves the affective, motor and cognitive realms" (Bastos et al. 2004) . It is influenced by *individual characteristics* (i.e., anxiety level, self-efficacy, motivation to learn, individual values, learning strategies and previous experience) and by *contextual characteristics* (i.e., psychosocial support and material support) (i.e., Warr and Downing 2000). Considering that some of these factors will vary, not everyone exposed to the same conditions will absorb the same stimuli and/or react to them in the same manner. Therefore, entrepreneurial learning is an active process of changes in attitudes (cognition, affect and behavioural intention) and behaviours that occurs at the individual level and that can be triggered by endogenous and exogenous factors.

Studies of learning processes with adults in workplaces have traditionally emphasized induced learning events, such as training and development programmes. Conversely, natural learning in organisational settings, or learning processes that occur continuously in a daily basis have scarcely been investigated in the literature. Natural learning results from the occupation of a certain job position or career or from contact with people or information from other groups or organisations. It differs from induced learning in that the learner is the one in control of the learning process, which comes about in non-structured and informal ways (i.e., Pantoja 2004). For the present study, entrepreneurial learning is considered to be predominantly natural and therefore the entrepreneur has agency on what and how to learn. The object of learning, it is reasonable to assume, is driven by the current start-up needs perceived by the entrepreneur. To cope with these, the entrepreneur will select the learning strategies that he or she considers the best.

Learning strategies are "activities of processing of environmental information that facilitate the acquisition, storage, recollection and application of learned information to the work context" (Pantoja 2004). In the formation and evolution of start-ups, learning strategies are highlighted as a set of measurable behaviours performed by entrepreneurs in a given learning situation and their consequences are related to identifiable outcomes at the start-up's level. Learning strategies are classified in three main types, each one composed by a set of categories. These are shown in Figure 1 (adapted from Pantoja, 2004), in which learning strategies occupy the first column, their correspondent categories the second column, and examples of contents the third column.

A crucial point in the study of learning in multiple levels, as is the case in entrepreneurial settings, is the time frame required to observe individual learning effects on the organisational level. As mainly in the first years of the start-up these effects result from bottom-up process, generating observable outcomes requires more time than would top-down processes (i.e., Pantoja 2004, Pantoja and Borges-Andrade 2004). The methodological strategy to investigate this aspect here was the use of retrospective interviews, in which entrepreneurs narrate past and current critical events in the start-up pathway (Flick 2007).

Figure 1
Learning strategies, categories and contents

Main categories	Sub-categories	Examples of contents
Cognitive strategies	Intrinsic reflection	Knowledge about different parts of the work; Knowledge on the specific work routines and procedures; Understanding how the parts of the work are interconnected; Association between new information and the routinely work events; Decision making on production strategies.
	Extrinsic reflection	Relationship between activities, strategies and the business of the organisation; Relationship between activities and the fulfilment of the clients' expectations; Relationships between your own work and the performance of different areas of the enterprise; Relationships between activities and market demands.
	Reproduction	Execution of established procedures, with no critical analysis; Continuous observation of specified steps until the execution of the work is automatized; Observation of the legislation according to what is established; Work execution according to the current standards.
Behavioural strategies	Seeking help from written material	Reading of the current legislation; Consultation to technical books and journals; Consultation to manuals of technical norms and procedures; Search in universities webpages in the internet; Elaboration of manuals describing the steps to execute the work.
	Interpersonal and inter-institutional help-seeking	Search for colleagues to discuss a problem-situation; Consultation with the more experienced colleagues; Teaching and transfer of knowledge to the newcomers; Clarification of doubts with suppliers; Listening the clients to apprehend needed details; Participation in technical groups of discussion in the internet.
	Practical application	Execution and practice of new knowledge; Gradual experimentation during the execution of the work; Incorporation of new information into the practice of the work; Trial and error.
Self-regulatory strategies	Emotion control	Procedures used by the individual to get rid of anxiety and to prevent focus failures caused by intrusive thoughts and anxiety. Ex: envisaging alternatives
	Motivation control	Strategies to keep attention and motivation up, even when the task is not much interesting. Ex: general social support
	Comprehension monitoring	Strategies to verify how much one is learning and/or to modify one's own behaviour.

Critical learning episodes

Investigating learning in organisations is a task that demands clear operationalisation, since, as stated earlier, learning is a continuous process, occurs at the individual level and has features that are not easily observable. For this research, learning is operationalised in critical episodes that mark the business start-up's evolution. The concept of critical learning episodes was originally created for the network level, referring to long-term changes in network practices, structures and interpretations (Knight and Pye 2007) and allowing comparative analysis across networks in different sectors (Knight and Pye 2004). When adapted to the firm level using the definitions explained below, the concept shows its usefulness to studying the evolution of business start-ups.

Learning episodes are bracketed and punctuated experiences in the continuum of start-up⁴ learning with "temporal and structural boundaries for their empirical case" (Knight and Pye 2004). Episodes result from complex webs of interactions, influenced by contextual factors. As Knight and Pye (2004, p. 481) put it "[t]hese actions and interactions are not evenly distributed in time or among actors, but can be seen as coalescing into a number of 'sub-plots' that are critical components of the episode storyline. Sub-plots can be compared across episodes". The chain of concepts involved in each learning episode is shown in Figure 2 (based on Knight and Pye 2004; 2007, translated to the start-up level).

Figure 2
Critical learning episodes: sub-plots, content and outcomes

Sub-plots	Learning content	Learning outcomes
Processes developing meaning	Changes in values and culture leading to the identity of the firm	Changes in entrepreneurs' interpretations
Processes developing commitment	Contributions of different actors shape the configuration of the start-up networks	Changes in network structures
Processes developing method	Application and embeddedness of change in the start-up operations	Changes in the start-up practices

As Figure 2 indicates this concept allows bridging economic and psychological theories of evolution and growth of firms and of learning. Each of the subplots pinpoints aspects of a search process in which entrepreneurs learning strategies are linked to learning outcomes at the firm level. The development of new meanings and commitment reflects attitudinal changes in the values and culture of entrepreneurs; whereas the development of new methods reflects changes in the behavioural patterns. One example of outcomes in these subplots would be the switch from public funding to angel investors for technology-based start-ups. As these start-ups evolve, their PhD entrepreneurs change their networks and reinterpret the relative importance of each actor (investors and government). Since not all outcomes will be incorporated into the start-up's practices, they are an intermediary step in the creation of new organisational routines. The actual routines are the outcomes that become part of the start-up functioning, concluding the search and closing the learning loop. The start-up, then, reaches a new stage of development in relation to the trigger of that episode.

Schematically, Figure 3 shows the net of concepts of this study.

The research, of which this paper is part, empirically identified 10 triggers to critical learning episodes (Table 1). These triggers corroborate the categories of knowledge in entrepreneurial ventures by Lichtenstein and Lyons (2006). These triggers would fit in technical, managerial or entrepreneurial knowledge. Personal knowledge was not analysed in light of the critical learning episodes and they are not reported in this paper.

This paper presents the findings for the most common critical learning episode, entry and permanence in the market. It was reported 70 times in a total of 37 start-ups. The qualitative

⁴ Originally, the authors referred to as "network learning".

analysis of the narratives showed that this type of critical learning episode is triggered by three main needs. The first is when the business needs to enter a well established market and to do so it has to develop a competitive differential or to design a competitive business model in order to attract buyers from other sellers. The second is the need to create a new market niche for a product that is a radical innovation, in which case the start-up has to reach out potential buyers. The third need is to outlive the threats to the permanence of the business in that market, such as price war and unfair competition.

Figure 3
Summary of the conceptual framework

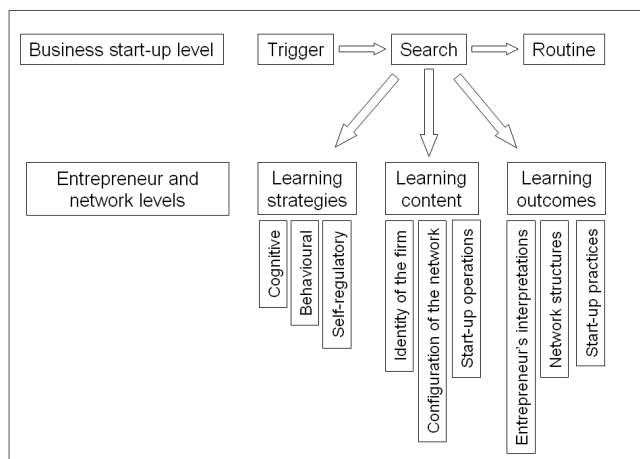


Table 1
Distribution of triggers to critical learning episodes

Episodes	N cases*	% cases
Entry and permanence in the market	37	25.87
Entrepreneur-specific triggers	28	19.58
Triggers not included in the other categories	15	10.49
Labour force issues	12	8.39
Lack of working capital	11	7.69
Access and relationship with suppliers	10	6.99
Access to investment capital	9	6.29
Regulation issues	9	6.29
Joint venture breakdowns	7	4.90
Access to technology	5	3.50
TOTAL	143	100.00

* The counting ignores multiple occurrences of the same episode in the same case.

Data collection and treatment

Retrospective interviews on the stories of business start-ups were conducted with small enterprises linked to business incubation programmes in the South-Eastern Brazil. These programmes are specifically designed to promote conditions for enterprise development and growth. Business incubators usually provide operational (i.e., infrastructure and basic informational services) and strategic services (i.e., consultancies and access to investors) at lower costs to small enterprises (Altenburg and Stamm 2004). All services provided by them are closely related to learning and networking processes, hence the appropriateness of

business incubators settings to research evolutionary processes in business start-ups. For instance, consultancies in finances and marketing combined with an environment composed by young entrepreneurs interacting with each other configure are part of a common picture of business incubation programmes. Most Brazilian business incubators are traditional when attending start-ups in the traditional sectors of the economy and technological when attending technology-based business or mixed when working with both types of businesses (SEBRAE.).

Critical learning episodes were categorised from the transcribed narratives of the entrepreneurs, resulting in the triggers above. The 37 start-ups analysed in this study were linked to 16 business incubators in two Brazilian South-Eastern States. They had been in operation for an average of 4 years ($SD=2.1$), 14 had graduated from the programme and 23 were still incubated. This paper describes the episodes related to entry and permanence in the market, in a crosscut fashion. Therefore, the evolutionary aspect of these episodes is investigated at the episode level (as illustrated by Figure 3), from its start until its completion (or otherwise until the state of affairs at the time of the interview). Structural (characteristic of the market) and agency factors (learning strategies) were taken into consideration in a temporal perspective (year of the start-up functioning in which the episode started).

Results

The evolution of the start-ups in term of 'entry and permanence in the market' was unpacked in triggers, learning strategies, elements of each critical sub-plot and the networks dynamics. Data was grouped based on two criteria:

- a) Year of the start-up lifespan in which the episode started;
- b) Market characteristic: entering an established market, creating or entering a new market, and surviving in the market.

General patterns indicate that the number of these episodes varies according to the year of functioning of the start-up (Figure 4)⁵. Overall, the number of new critical learning episodes related to entering and surviving in the market ranges from 16-22-15-9, respectively in Year 1, Year 2, Year 3 and Year 4, slowing down further on. When one considers the sub-categories of triggers, the first year is the most critical for those entering an established market. Episodes related to the need to enter or create a new market and to survive in the market, however, show a peak in the second year. This may be an indication that for these cases the first year was dedicated to the development of the product or service as well as dedicated to actually entering the market – therefore the increased occurrence of episodes related to the need to survive in the second year.

A more detailed analysis of the 70 episodes per duration of episode is presented in Figure 5. Most of the episodes last between a few months and 1 year, or are in progress. There seems to be a pattern related to the characteristics of the market. As the circles indicate, episodes in the first year last longer for start-ups trying to enter an established market. In contrast, those creating or entering a new market show shorter episodes in the first year. Interestingly, this pattern seems to be reverted when the episodes start in the third year, with shorter episodes amongst those operating in established markets. A possible explanation could be drawn from cumulative learning, but since only one of these cases had experienced a previous episode of entry and permanence in the market, there are probably other factors related to this result such as the occurrence of other types of critical learning episodes. As expected, most of the episodes started in the fourth year are in progress, since 30% of these start-ups (4/5 of the episodes in progress) were in their fourth year of operation when the interview was conducted.

The next sections will explore the qualitative information that underlies these patterns.

⁵ Note that the duration of each episode is not taken into account here.

Figure 4

Number of critical learning episodes on entry and permanence in the market per year

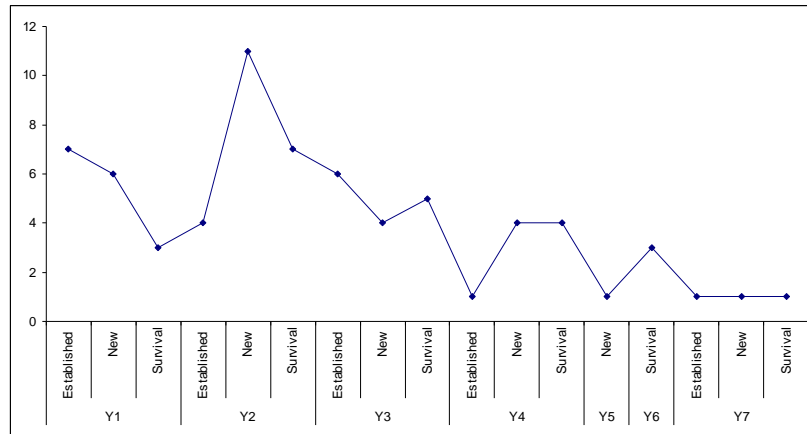
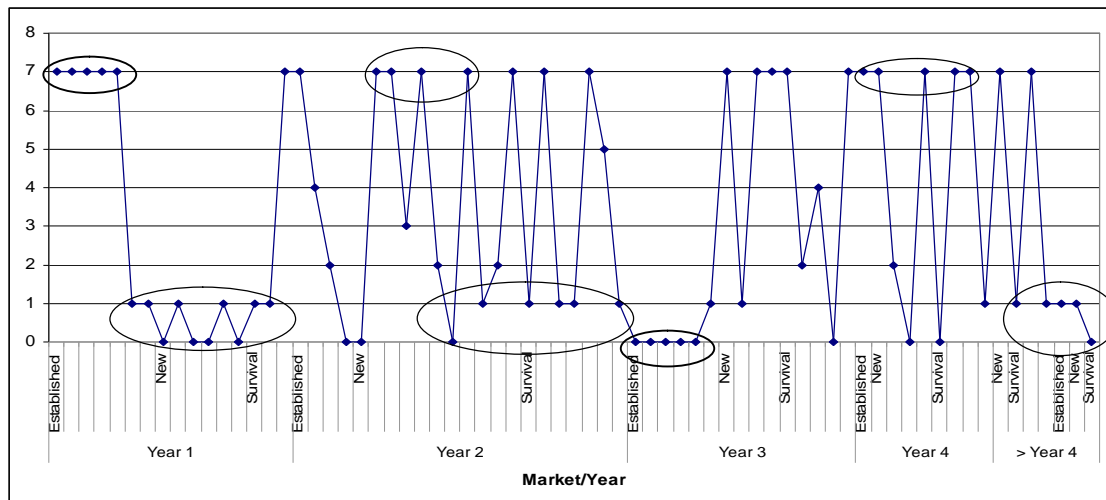


Figure 5

Duration of CLE05 per year and per sub-category of market



Note: Axis Y: 0 = episodes shorter than 1 year; 7 = episodes in progress

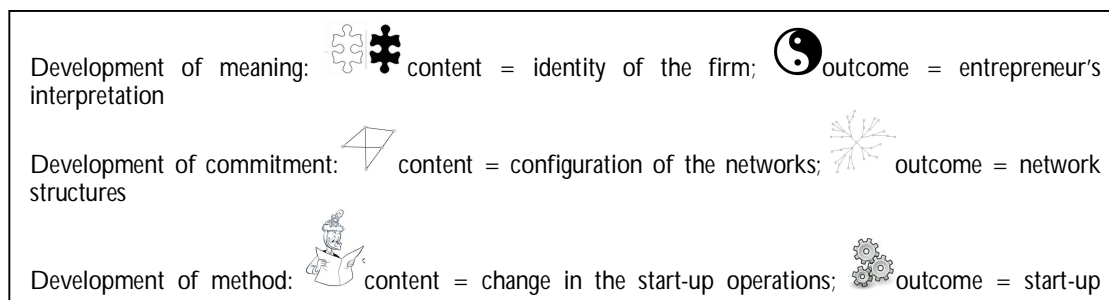
Critical learning episodes

The elements of the critical learning episodes of entry and permanence in the market are described in terms of content and actors of a trigger, learning strategies, learning content, learning outcomes, new organisational routines and the duration of each episode. These are organised as above, per year and per type of market. However, given space limitations, only episodes started in the first and second years are presented. Furthermore, to aggregate information and simplify the message, the detailed data of types of learning content and learning outcomes were replaced by symbols as displayed in the legend⁶.

⁶ The selection of the symbols reflects the content of the narratives for the majority of the cases. The puzzle pieces reflect the fragmentation of the information to which the entrepreneur has access to in the beginning and his/her efforts to put them together and create the identity of the firm. The yin-yang symbol represents the balance achieved by the entrepreneur in the outcome of a given episode. This balance, however, is mutable and on the move, as new information or triggers come in on the start-up pathway. The small and redundant network and the expansive network reflect the evolution of the entrepreneur's connections during a given critical learning episode. And, at last, the Gyro Gearloose represents the entrepreneur's attempts to develop new methods of management and production, which in most cases results in successful coordinated outcomes for the start-up survival (the working gears).

Figure 6 shows the episodes on entry and permanence in the market that started in the first year of the business.

Across episodes, the role of initial actors ranges between two opposites. In one direction, they open up opportunities for the start-ups to enter and survive in the market (i.e., increased demand for the products). In the other direction, the initial actors close or narrow down the start-up's access to the market (i.e. by developing a non-marketable product). From these actors, the start-up itself and the buyers are the most important triggers in the first year, more often closing access to a market. However, to reverse this situation, entrepreneurs apply several strategies (discussed in the next section). These strategies lead to learning processes whose outcomes at the firm level are expressed in routines that aim to open up the access to the market. Examples of these routines are: investing in new market, changing the production line, developing better managerial routines.



This expresses empirically the discussion in Penrose's theory on the use of otherwise idle resources to promote the diversification of the products, the enhancement of the services, and it indeed carries the start-up onto new directions. As this study shows this approach, meant to explain expansion of firms, is also valid to explain their establishment in the market.

In the characteristics of markets, the table shows that needing to enter an established market leads to learning contents focused on the development of innovative methods. For all these cases the categories of learning outcomes match with the categories of learning contents. Comparisons between triggers and routines show drastic changes for some start-ups. The new routines express their adaptability to market niche demands through decisions about refocusing the business. It is noteworthy that most of these episodes are in progress, indicating that these critical changes consume the first years of the start-ups when they need to enter an already established market.

In cases of needing to create or enter a new market, the development of new methods and the establishment of networks are the main learning contents. It is noticeable that for 50% of the episodes, the learning outcomes included also the development of new meanings for the start-up, that is, the formation of the business' values and culture. In one example, a team of young entrepreneurs, recently majored in Engineering, were focused on the development of the product for 2 years. When the product was ready, they faced difficulties to insert it in the market, in spite of the well known technology embedded in the product. Entering the market was not possible with that product and as part of the lessons learned they report the importance to balance their own interests in product development with market interests. This new perspective, balancing technical, technological and market-based knowledge emerged from their learning process.

Figure 6. Critical learning episodes started in the first year of the business start-up (n=16)

Trigger	Actors	Strategy	Learning content	Learning outcomes	Routines	Duration
Established market (n=7)	Need to cope with high barriers to entry in the surgical instruments' market	try a market or easier entry (easier registration and legalization)			Development of a new production line, with a new business-network.	On (>3y)
	Refusal of clients to accept receipts (to reduce tax expenses)	Diversification of sales according to the clients			A combination of formality and informality in the business transactions	On (>3y)
	Big companies had difficulties to deliver the promised service	Search for partnerships with competitors; sales when competitors failed			Partnership with former competitor: their expertise plus the competitor's sales structure	On (>6y)
	Brother and sister in law stimulated the beginning of the business	Use of production waste to design the first models, under the relatives' supervision			Continuous guidance from the relatives on trends, cuts, sizes and adaptations to the clientele	On (>3y)
	Uniqueness to establish the business in the market of surgical instruments	Search for information with friends, search and business incubator			Previous analysis of the market and establishment of partnerships before entering a new market	On (>3y)
Need of formalizations to enable sales to other enterprises (beyond the unique buyer)	Search for places to install the industry; friends' indication of the business incubator			Formalization of the business; no hurry for licenses (business is in second place)		
Relocating of the start-up to the wholesalers' market	Start-up	New cost sheet for wholesalers			Close negotiation with buyers for alternative products to keep prices down and quality high	
New market (n=6)	Need of water-soluble packages for ethanol fermentation	Import from China; adaptation of conventional packing machine			Service provision in packaging chemical products according to tailor-made formulas	<1
	Increasing demand for the products	Extended working hours; outsourcing; hiring of a secretary			Formalization of the business; structuration of formal labour force	
	Realisation that the initial business plan was unviable - only "class A"	Guidance from finance and marketing consultants			Change in the focus of the start-up towards a broader and well established market, with higher competition	<1
	Market research showed a period of 2-3 years to generate income	Networks (a partnerships; 1) trigger enterprise in the sector for product development; 2) university + incubator for courses			Creation of an educational department, apart from the core business. Business is a long-term investment	<1
	Development of a software that was not marketable	Development of a marketable product; partnerships for sales (failed)			Price "best enterprise of 2008"; The entrepreneur has to know his market"; shared focus: development and market	
Persistence in the market (n=3)	3rd place in an entrepreneurial contest in the university (incubation + money)	Courses and events organised by the business incubator			Orientation towards aftermarketing (regular motorcycles); temporary end of the fellowships for interns	<1
	Loss by the nature of the second product to enter the market	Business incubator; finance consultancy + general guidance; courses via university and SEBRAE and access to clients. Bank loan			Reduction of use of financial favors by friends; bank loans cause more costs; focus on services for the food sector	
	Clients in default	Bearing the costs themselves (incubators' fee, suppliers, registrations); later: local cooperative of credit			Bank system to invoice clients; instead of bank transfers to their personal accounts.	
	Too many sales for the production capacity (4000-8000 pairs)	Extended working hours; outsourcing; SENAI technicians; financial & marketing consultant; design consultant			Mix of consultants' services and their own opinion in production management; (in progress) better balance between sales & production capacity	On (>2y)

Although with different contents, the development of new interpretations about the business is a typical learning outcome for the first year of start-ups entering or creating a new market. Comparisons between triggers and routines demonstrate the development of alternative products and services while the entrance in the new market is worked out. These alternative products generate working capital and allow the formation of business-related networks, which may facilitate the insertion of the main product or service in the market. These episodes are the shortest ones in the first year, with new routines being developed within few months for 2/3 of the episodes.

Episodes related to survival in the market, as expected, are few in the first year. They occur for start-ups whose entrepreneurs already had some expertise and connections in the sector, and which start-ups products do not require heavy technological development (advertising material, consultancy and shoes). These episodes show a search for knowledge on how to run the business, widen networks and find or develop innovative working methods. Here, the learning outcomes show that entrepreneurs accomplish this task, with resulting routines clearly related to unlearning previous behaviours and working routines (i.e. incorporating expert advice and the use of business services for financial management). These episodes last between 1 and 2 years.

Figure 7 shows the critical learning episodes of entry and permanence in the market that started in the second year of the start-ups' lifespan.

It is remarkable that none of these routines refer to changes in the target market. There seems to be a stronger effort in developing variations in the mix of products or services and in the development of technological innovations based on the products or services that are already being traded. Another difference in relation to the first year episodes is the increased dynamism between learning contents and learning outcomes. Even when the entrepreneurs do not aim at changing the configuration of their networks, 46% of these episodes present learning outcomes of maintenance, expansion or strengthening of networks, inclusive in times of crisis. New interpretations emerged in three cases when development of meaning was absent in the learning contents.

The analysis per sub-categories of markets indicates that the number of episodes of entering an established market dropped from 7 to 4 from Year 1 to Year 2. Two are related to competition and two to the start-ups strategies to enter the market. The routines touch upon partnerships to reduce market entry costs and to improve the production process. Production-related routines refer to increasing the mix of products based on the technological resources already available to the start-up.

Episodes of entering or creating a new market show great diversity of contents. There are triggers on the need to reach out buyers (4 episodes), which routines vary from participation in fairs and liaison by the business incubator with formal buyers, to growth up to semi-industrial production levels. In one case, the routine in the making is the rethinking of business identity (service provider or royalties' developer). For other cases, the trigger drives the start-up to expansion and growth, resulting in routines such as investment in a sub-sector of the target market, and the creation of a spin-off of the first business. There are also similar routines triggered by different issues, i.e., the development of managerial schemes to deal with market dynamics was triggered by purchase offers from competitors, by the preparation to sell a product and by the initial move from a potential research towards a marketable product. The episodes in this set are usually complete within one year.

In the group of permanence in the market, buyers are the key actors, mainly posing barriers to the survival of the start-up. For the episodes related to the international financial crisis, the routines established by the start-ups are of maintenance of clients and contingency of expenses. In three cases the new routines are of expanding the innovation processes in terms of shortened creation cycle and increased variety, be it triggered by demands from buyers for a wider range of products, be it to beat the competitors that are copying the product.

Figure 7. Critical learning episodes started in the second year of the start-up (n=22).

Trigger	Actors	Strategy	Learning content	Learning outcomes	Routines	Duration
Established market (n=4)						
Need to participate in fairs to enter the market	Bi consultants	Partnerships with other small and medium enterprises in the market			Business-related partnerships to share costs related to enter the market.	On (>2y)
Negative advertisement. Unfair competition by his former employer	Big companies	Count on the support of the business incubator			Production of regular and special pieces, with high quality and good price to be able to compete	4
2 too big sales right from the start	Buyers; start-up	Hiring workers, all associates dedicated to programming			Modernization of the systems, creation of a web application (easier sales, less workload). Partnerships to develop new products	2
Entrepreneur next door offered a 172 price quotation and took his client	Other incubatee	Locking the start-ups door and cutting relationships with the other entrepreneur			Keeping the start-up businesses indoors; no sharing of information.	<1
Participation in fairs to launch the products	Business incubator, SEBRAE	Display of the first sets of guitar pedals to "try" the reaction of the market			Use of fairs to try and to enter the market. Marketing of the business via "endorzers" on the website	<1
Resistance of laboratories to outsource R&D	Buyers	Subventions from the government (FINEP)			(in progress) Creating conditions to develop higher scale innovators in advance of the market demands; possibility to profit from royalties	On (>2y)
Demand for services from enterprises in areas other than dairy	Buyers; Ministry of Agriculture	Studying the legislation for animal food sector			Expansion of the scope of the business to other sectors in food production	On (months)
Restrictions to enter the market of researchers	Buyers; start-up	Publications; patent; free samples/special prices; NOVATEC (fair); registrars (ANVISA, MAPA, Federal Police, <u>BRAC</u> Council Chemistry)			Semi-industrial production, 1 formal job	3
Competitors interested in buying their technology	Competitors	Keeping records on the offers for merging, buying or investment			Establishment of a decision making system for offers of big companies/investors	On (>1y)
First contacts with potential buyers (researchers)	Entrepreneurs; buyers	Partnerships with researchers that had developed antibodies for their own research			Spin-off of the first start-up for the agriculture sector; balance between market needs and technology developed	2
Need of new buyers	Start-up	Support from the business incubator			Broader portfolio of clients	<1
Preparation to sell the product	Start-up	Structuration of marketing and commercial areas; fairs; PJIME consultants; partnership with leasing			Internal (university) and external divulgation of the firm; (in progress) development of strategy to enter the market	On (months)
Research with high economic potential, but no expertise in industrialisation	Start-up	Business incubator (consultancies, fairs); contacts with the university, public funding (CNPq, FINEP)			Formal contracts with the university labs (intellectual property); change of equipments (research vs. production); research vs. firm timeframes	1
Expensive prices for highly concentrated chemicals	Suppliers	Import of lower concentrations (at 20%, 40%) to purify the chemicals at 90% in Brazil			(in progress) Planning and developments (computerizing) for the installation of the chemical plant	2
How to market the product	Entrepreneur	Application of her previous knowledge in soft marketing			Use of softer marketing strategies to advertise the product	<1
New market (n=11)						

Table 7 Critical learning episodes started in the second year of the start-up (n=22) (cont...)

Permanence in the market (n=7)								
International financial crisis reaches the industries (buyers) - no new contracts	Buyers	Focus on contracts of maintenance				Maintenance contracts are an alternative to market crisis.		1
Market demand for monthly new creations	Buyers	Hiring of a stylist				Division of tasks between associates: sister does exclusively modeling; Monthly creations		On (>2y)
Important client in default	Buyers	(Failed) trials for bank loan (CAXA); later: business account in another bank. (BB) (2007)				End of the working capital problems; given the bank facilities to the business (from year 2 on)		1
Clients in default because of the financial crisis	Buyers	Good financial management by the brother				(in progress) Working on a deficit of labour force until they are sure the crisis is over; focus on the SP and RJ States		1
Rapid acceptance of the 1st product + demand for a mix of products	Buyers	Development of a mix of products based on the technology of the 1st				Fast development of new technologies and derived products; focus on "development for technological innovation"		On (>1y)
Clients in default	Buyers	Search for more clients; demanding quality from suppliers				Trust-based relationship with clients		5
Copies of a patented product in China, by a competitor (found in a fair)	Competitors	Investment in technology to outdate the copied product				Developed technologies are made obsolete every 3 months		1

There are two different reactions to triggers about clients in default: one start-up relied on bank facilities, whereas another invested in broadening the portfolio of clients and in strengthening the networks with suppliers and buyers. Most of these episodes are also complete in approximately 1 year.

The description of these episodes demonstrated the variety of learning strategies applied by entrepreneurs. The next section will explore possible patterns in these strategies.

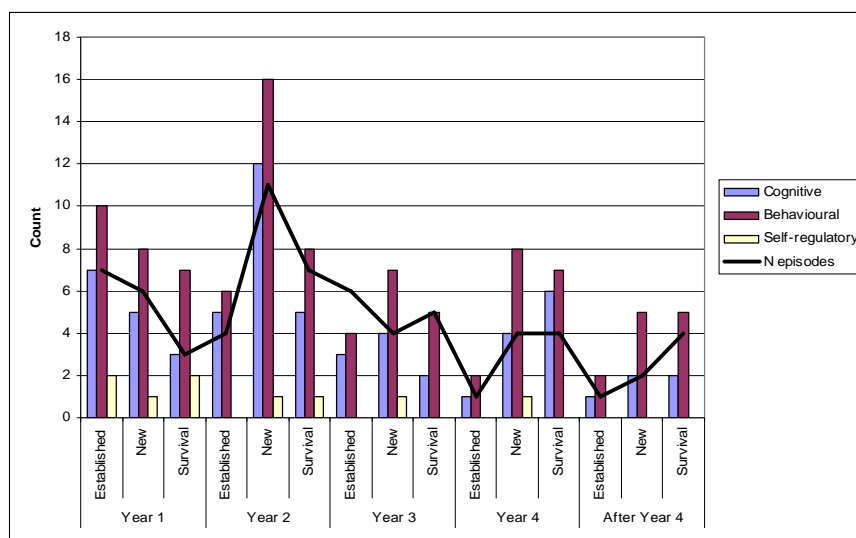
Individual learning strategies

As described in the theoretical framework, learning strategies are used by individuals to engage in learning processes. Strategies can be cognitive, behavioural or self-regulatory, each with its sub-categories. This section describes patterns of these strategies, first based on the main categories and then on their most frequent sub-categories.

Figure 8 shows the distribution of types of learning strategies per year of the start-up when the episode started and per characteristic of market. Over time, behavioural strategies are preferred to cognitive strategies and self-regulatory strategies are marginally reported for episodes of entry and permanence in the market. The result indicates that the distribution of learning strategies is closely related to the number of the critical learning episodes, not showing specific patterns related to structural (market) or temporal factors (year in which the episode started) for the aggregated data (the sum of all sub-categories of learning strategies).

Figure 8

Most frequent categories of learning strategies per year, market and number of episodes



An analysis of the relationships between types of strategies showed a correlation of .94 ($p < .01$) between cognitive and behavioural strategies. The correlation between the sum of strategies and the number of episodes is .87 ($p < .01$). These coefficients indicate that entrepreneurs consistently combine cognitive and behavioural strategies. Moreover, the preferred behavioural strategy is practical application (reported 50 times in 70 episodes). This strategy directly influences the formation of new organisational routines, since they refer to the actual implementation of new knowledge. It comprehends the application of new knowledge (i.e., use of the cost sheet provided by financial consultants), gradual experimentation during the work (i.e., the creation of new designs in clothing), incorporation of new information into the practice of the work (i.e., establishment of knowledge management tools in contexts of high turnover), and trial and error (i.e., the development of the product itself in the electronics sector).

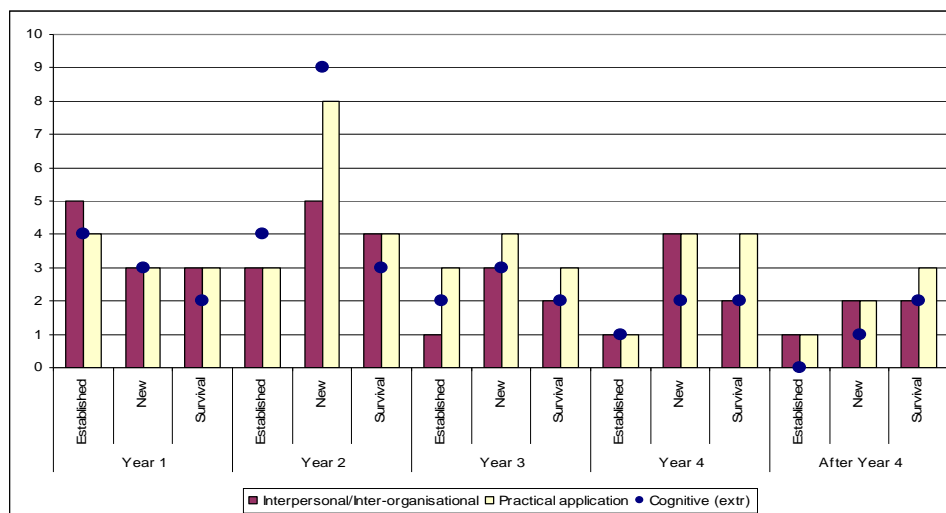
The next most frequent behavioural strategy is interpersonal/inter-organisational help-seeking. It reflects the search for colleagues to discuss problems (i.e., other incubatees or former classmates), transfer of knowledge to newcomers (i.e., training of interns), clarification of doubts with suppliers (i.e., trust-based relationships for acquisition of material and other inputs), relationship with clients for details (i.e., inputs from buyers to improve the technology or broaden the mix of products), search for experts in specific topics (i.e., reliance in finance and marketing consultants).

Cognitive strategies reflect particularly the use of intrinsic and extrinsic reflection. For intrinsic reflection, the results indicate that entrepreneurs allocate efforts to learn how specific routines and procedures work (i.e., cash flow), how parts of the work are interconnected (i.e., productive capacity and sales break-even point), and to learn from the association between new information and the work routines (i.e., how to deal with contracts under the impact of the international financial crisis). In extrinsic reflection, which was as frequent as behavioural strategies of interpersonal/inter-organisational help seeking, entrepreneurs work on the critical learning episodes by learning about the relationships between their activities, strategies and the business of the firm (i.e., the appropriateness of a certain business model), about relationships between their activities and the fulfilment of clients' expectations (i.e., decision to broaden the mix of products given clients demands), and about the impact of their performance in different areas of the start-up (i.e., understanding the importance of clearly defining tasks between associates).

The next analysis considered only the most frequent sub-categories of learning strategies: practical application, interpersonal/inter-organisational help seeking and extrinsic reflection. Figure 9 presents the results per year and per market. This closed up focus suggests patterns per market in relation to the combination of the cognitive strategy of extrinsic reflection and the behavioural strategy of practical application.

Figure 9

Comparison between the most frequent cognitive and behavioural learning strategies



For critical learning episodes started from Year 1 to Year 3, entrepreneurs entering or creating a new market make systematic combinations of these two strategies. They consistently examine the relationships between the internal activities performed in the start-up and the clients' needs, the interconnections between different internal practices, and the relationships between activities, strategies and the business of the start-up. This reflection changes practices in the start-up, not necessarily mediated by interpersonal or inter-organisational influences, though networking-based strategies play also an important role. Why in new markets? Probably these entrepreneurs had few or no role models, pre-

established procedures, or pre-set support institutions to work on the critical learning episodes they were confronted with to enter or create a new market.

Complementary, practical application strategies are predominant in those episodes of survival starting as of the third year of the start-up. Different than in the new market's analysis, cognitive strategies are as present as interpersonal/inter-organisational strategies. Very likely, entrepreneurs at this stage may have developed a set of responses to triggers and a full range of organisational routines that might be relatively stable. Hence these routines provide inputs for practical application strategies, in consonance with the theoretical assumptions of application of the internal resources as the first step to solve new triggers. The predominance of practical application may be two-sided, since, at the same time, they point to the internal maturity of the start-up and to institutionalised practices that may hold dynamism and innovation.

Networks' dynamics

This research assumes that networking is a critical process for the evolution of business start-ups. It was shown in the previous section that indeed interpersonal and inter-organisational help seeking is the second most important learning strategy used by entrepreneurs. This section applies some techniques of social network analysis to investigate who are these actors and to describe the network dynamics of business start-ups. The configuration of the entrepreneur's networks indicates who the resourceful actors the entrepreneur exchange resources with are and who the entrepreneur acquires resources from. Moreover, it is expected that business start-ups become gradually more embedded in market-based networks.

This paper anchors the evolution of networks in critical learning episodes of entering and surviving in the market in two points in time:

- a) The initial networks, by the time when the idea of the business was elaborated;
- b) The configuration of the start-up's network at the end of the last episode of 'entry and survival in the market' – keeping in mind that this episode is recurrent. It includes all actors that were incorporated to the entrepreneur's network throughout the start-up pathway.

Note that in spite of the level of detail, these networks are partial, since other actors related to other types of critical learning episodes were not included in the analysis. The symbols in the figures below represent:

- a) Shapes: circles are entrepreneurs from the São Paulo State and squares are entrepreneurs from the Minas Gerais State;
- b) Colours: red = entrepreneurs that were 'pushed' to start their own business, either by following advices from university professors or by being fired from big companies. Black: entrepreneurs that always wanted to start a business or that have tried other business before. Gray: business incubators. Blue: all other actors.

Figure 10 shows the configuration of the initial networks of a sample of 23 entrepreneurs (out of the 37). It indicates three types of actors: family members or friends who have some degree of expertise in that type of business; contacts from previous job experiences, i.e., former co-workers, potential buyers; and support institutions, i.e., a business incubator or SEBRAE. Business incubators surround SEBRAE, since all of them have formal relationships with this institution. In the same area of the figure, there are also other support actors, such as consultants (usually linked to SEBRAE and to the business incubator) and university-related actors (i.e., university professors may be part of the joint venture).

Most of these entrepreneurs report the business incubator as part of their initial network, to which they go seeking for managerial guidance or physical space in the first place. Alternatively, 44% of the entrepreneurs are indirectly linked to business incubators, through their networks with friends, family members, or the university (most of the technological incubators are located inside a university campus).

Figure 10
Configuration of the initial social networks of a sample of 23 entrepreneurs

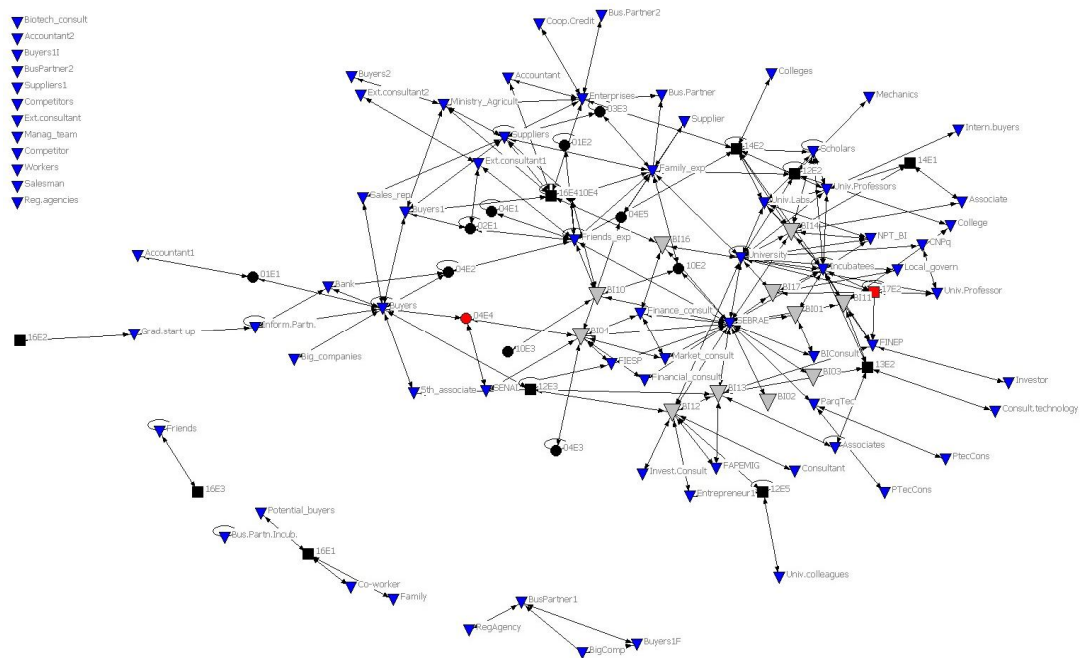


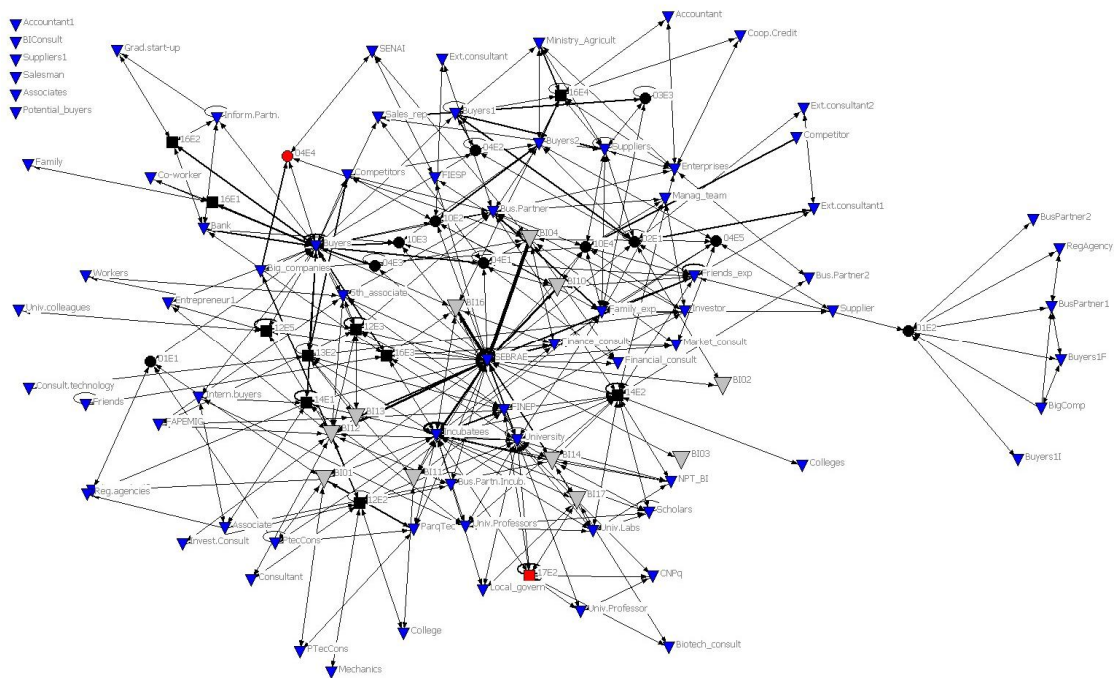
Figure 11 shows the configuration of the start-up's networks at the time of interview. It shows a denser network with three layers. At the centre there are the support institutions: SEBRAE, business incubators, university, consultants, foment governmental agencies, other incubatees. This core set of actors is surrounded by the start-ups, which are now more strongly linked to the system of business development services. The outer layer shows the other actors with whom the start-up has weaker relationships. It ranges from consultants to former colleagues and competitors. The thicker lines indicate the number of ties between these actors, showing the importance of SEBRAE and of buyers in the network.

The two networks were compared through social network measures of centrality⁷ and core/periphery. The five most central actors in the initial network are SEBRAE, university, other incubatees, buyers and expert friends. The five most central actors in the current network are SEBRAE, buyers, other incubatees, university and the start-up 14E2 (possibly because of its extensive network). Central actors are those providing information or being referred to for guidance by the other actors. Centrality is usually associated with a measure of power in the network, since central actors sit in the most strategic positions and hold critical resources. Thus, it is not surprising that SEBRAE is the most central actor in both networks, since all business incubators have formal contracts with SEBRAE to access financial and strategic resources (i.e., monthly allowance per start-up and consultants). In sequence, the mediation role of business incubators arises, since entrepreneurs only relate to SEBRAE's services in a longer term perspective if they are enrolled in a business incubation programme. SEBRAE offers punctual guidance and short trainings to wide public, but these do not have a continuous character. However, the networks' centrality measure does not capture the mediation by business incubators, since each incubator was taken individually and SEBRAE was considered at the central level⁸.

⁷ Centrality is a whole network measure; it considers all indications of relationships amongst all actors and not only indications of entrepreneurs.

⁸ Business incubators interact directly with the local offices of SEBRAE, but since all of them follow central rules, the few local diversified services did not justify the splitting up of SEBRAE in these local offices.

Figure 11
Configuration of the social networks of a sample of 23 entrepreneurs by the time of the interview



A complementary analysis is core/periphery, which indicates the actors in the core of the network, through which more resources are exchanged and to which the peripheral actors tend to relate to access resources. Relationships between peripheral and central actors tend to be more frequent than relationships within the group of peripheral actors. The results show that the core actors in the initial network are: SEBRAE, other incubatees, universities and BI04 (the business incubator with the highest number of cases in this sample). However, for the current networks, when the number of actors is higher and the strength of the relationships is stronger, the core actors are: SEBRAE, other incubatees, universities, buyers, BI04, finance consultants, BI12, BI14, 14E2, university laboratories, NPT_BI14, BI16, and 16E3. By the time of the interview, 4/11 business incubators become central in the configuration of the network, as the start-ups become more embedded in the institutional setting of business incubation programmes.

The role of informal networks with other incubatees is noteworthy in both analyses. They play an important role even in the initial stage of formation of the business, by linking up the entrepreneur to the business development services. Once inside the programme, entrepreneurs rely on other incubatees mainly for exchange of information on funding and managerial practices. Moreover, they also establish formal partnerships for product development and/or service provision between themselves.

A number of other measures of these networks were taken, but centrality and core/periphery were chosen the most illustrative to show the network dynamics of business start-ups. It is important, though, to emphasize that these results are fully dependent on the reports of the entrepreneurs and that there might be many relationships underrepresented in these networks.

Conclusions

The objective of this paper was to discuss the evolution of business start-ups based on the concept of critical learning episodes as theoretical and analytical tool.

The breaking down of a business start-up pathway into critical learning episodes and the critical learning episode into triggers, actors, learning strategies, learning contents, learning outcomes and organisational routines provided rich information on processes that Penrose (1980, p.42) called "the nature and extent of the 'subjective' productive opportunity of the firm". The results showed that triggers may be endogenous or exogenous, corroborating Nelson and Winter's claims (1982) about deliberate and non-chosen processes for change. It is noteworthy that some deliberate choices may lead to hazardous outcomes and trigger new learning episodes, as in the case of mistaken decisions by the entrepreneurs that hindered their entrance in the market. Learning strategies, in turn, are the measurable aspect of deliberate choices of entrepreneurs to develop new organisational routines in face of a critical episode. This briefly introduces one of the theoretical contributions of this paper, the transit between concepts from these different theoretical approaches, which were originally elaborated for different levels of analysis and that here were complementary to each other to compose the moving scene of the evolution of business start-ups.

The concept of critical learning episodes was a useful analytical tool to systematise the narratives of the entrepreneurs in terms of the creation of new meanings (i.e., the added value of a business development service), new commitments (i.e., the establishment of business-related partnerships), and new methods (i.e., reconfigurations of products and production processes). The application of the concept in this research included multiple levels of analysis and allowed the combination of structural, agency and temporal factors. Triggers tackled from macro structural issues such as the international financial crisis to individual choices such as selling beyond one's productive capacity. Entrepreneurial attitudes and behaviours such as relying on public funding and applying for governmental grants were reflected in learning outcomes and further on in organisational routines, by the acceptance and introduction of private investment in the business. The detailed analysis of learning strategies per market disclosed the interaction between a structural factor and the agency of entrepreneurs to learn in different market contexts. The comparisons of these plots per year opened up some factors in the black box of the first years of the evolution of business start-ups. The results showed, for example, that the balance between search and routine changes from the second to the third year, with the established routines providing more inputs to deal with critical learning episodes related to survive in the market (but not for entering a new market). Therefore, critical learning episodes are a useful analytical tool to examine these dynamic contexts and to draw comparisons.

The results indicated a bias in the literature towards the acquisition of existing resources. Penrose (1980), Cook and Morgan (1998), Best (1990) and Pantoja (2004) emphasize access to resources throughout their theorisations. This might be attributed to the complex organisational systems they focus on. However, the results indicated that resources are also created, developed or produced by entrepreneurial activities as demonstrated by the combination of learning strategies of extrinsic reflection and practical application. Learning is not restricted to acquisition and transformation; it also includes creation of new resources. This conclusion has theoretical and practical implications. Theoretically, it suggests that path dependency is part of the explanation of the evolution of business start-ups, but it does not account for the entire story. Path-dependency is interrupted by critical learning episodes, in which entrepreneurs develop new resources that, when transformed into services, change the pathway of a start-up. Path-dependency is, therefore, a structure-agency phenomenon. Not all critical learning episodes break the path-dependent growth, but, as suggested by the results here, only those that combine new interpretations by the entrepreneurs with new methods of management and production. One example is the entrepreneur whose previous endeavours failed and who now learns the concept and the practice of working under a break-even point..

The fact that the people in the start-up are the same, that part of the physical structure remains the same, that even most of the actors in the entrepreneur network are still there, may mask drastic qualitative changes in the content associated to these factors. A new

mindset of the entrepreneurs, a completely new use of the physical structure (innovative services) and diversified role of actors in the network characterize a switch in the start-up's pathway that is not explained by path dependency assumptions. Furthermore, breaking the path dependency seems to be crucial for surviving in the first years for those with entrepreneurial experience and for those with work experience in other types of endeavours (i.e., scholars and access to funding, former employees of bigger and more resourceful enterprises). Entrepreneurs report deliberate breakdowns in their pathways towards new directions. For instance, various cases create by-products/services to generate working capital instead of relying on bank loans or governmental grants as they otherwise would do if following path dependent processes. In practical terms, institutional arrangements for innovation and market development/expansion should take into account individual capabilities to produce new resources, in addition to those that are institutionalised. One constructive example is the organisation of consortia between incubatees around a product or service in common – which was presented in a couple of business incubators. Creating a pool of ideas and diverse views might lead to innovative pathways that otherwise would not exist if those start-ups were relying exclusively on their past experiences, current expertise and expectations for the future.

This discussion brings in the issue of changes in the configuration of the networks towards the embeddedness of business start-ups in the market. The analysis of the networks demonstrated the increased central role played by business incubators and support institutions. Buyers are the only actor of the market realm occupying a central position in the network. Market-related actors, such as suppliers, business partners etc, are in the periphery of the network representing weak ties in Granovetter's terms (1983). This is a desirable scenario for innovation and inflow of new information and resources into the business start-up networks. However, since peripheral actors tend to seek information from central actors, the importance of market-based peripheral actors may be underestimated by entrepreneurs and valuable information may be missed. For instance, in only one case it was observed that one episode of unfair competition led to the strength of the relationships of the start-up with suppliers to guarantee the quality of the raw material and regain clients. Alternative strategies like this, instead of the usual bank loans and shrinking of production levels, represent a dynamic use of the network towards the financial health and the growth of the business.

Endnotes

This research has two limitations worth mentioning. The first is the absence of a control group of business start-ups not linked to any business development service. Would the new organisational routines be different for the same type of triggers if other actors were providing information to the entrepreneur? Would the arrangement of learning strategies be different? Who would be other central actors in the networks of these business start-ups? From the data, the only inference in this regard is that buyers might be critical for episodes of entry and permanence in the market regardless of any business development service.

Another limitation is that network data is based on self-reports of entrepreneurs about the relationships between the actors in their networks, characterizing ego-networks. There are possibly many more relations than the ones portrayed in the results, what requires careful interpretation of the results at the network level.

The research agenda includes the investigation of other critical learning episodes and comparisons between them in terms of learning strategies and network evolution. Are there distinct patterns for different types of critical episodes? Another branch of analysis is a longitudinal comparison of critical learning episodes examining temporal effects of the unfolding of different episodes over time within cases.

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