



Spin-off Process and the Development of Academic Entrepreneur's Social Capital

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Abstract

So far, there has been very little in-depth research on how the spin-off process contributes to the development of academic entrepreneurs' social capital. In this inductive, exploratory and qualitative study, we examine eight academic entrepreneurship case studies. Based on our findings, we propose three mechanisms to explain the contribution of the spin-off process. They are the entrepreneurs' affiliation with the university, the entrepreneurs' immersion in the university's network of relationships, and the new venture creation preparation given to the entrepreneurs by the university.

Keywords: academic entrepreneurship; entrepreneurship; incubators; networks; social capital; spin-offs; technological entrepreneurship; university spin-offs.

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Introduction

Research has shown that one of the factors that may contribute to the success of a new venture is the entrepreneur's social capital (Anderson, Park and Jack, 2007; Audretsch, Aldridge and Sanders, 2011; Davidsson and Honig, 2003; Kim and Aldrich, 2005; Neergaard and Madsen, 2004). Social capital allows entrepreneurs to obtain resources that would otherwise not be available to them at all, or would only be available at a much higher cost in terms of time, money and effort.

Given the significance of social capital to entrepreneurs, researchers have examined its features, how it develops and how it is used to benefit a nascent venture. Studies to date have shown that the initial social capital of entrepreneurs (Liao and Welsch, 2002; Murray, 2004), as well as their social skills (Baron, 2004; Baron and Markman, 2003) and their networking efforts (Bourdieu, 1986; Ferraro, 2003), are all key elements in its development.

All these studies, however, were limited by one specific factor, namely that they focused on the creation of traditional businesses without the support of a mother organization. This is clearly not the context for academic spin-offs, which are technological ventures born inside a mother organization (the university) and which receive a range of support from that organization. Some of the social capital developed by academic entrepreneurs results from the spin-off process. This is due to the fact that the university, with its network of connections, its credibility and its support structure, is able help its entrepreneurs to develop new contacts and expand their social capital (Chandra and Silva, 2012; Grandi and Grimaldi, 2003; Hughes, Ireland and Morgan, 2007; Mian, 1996; Shane, 2004; Totterman and Sten, 2005; Uzunca, 2011).

Despite this, there has been very little in-depth research into how the spin-off process contributes to the development of academic entrepreneur's social capital. This paper presents an inductive, exploratory and qualitative study that was designed to address this gap in current knowledge.

Eight academic entrepreneurship case studies, chosen on the basis of maximum variation criteria (Patton, 2002), were examined. Maximum variation was guaranteed by the key elements in the spin-off process: the mother organization (the university), the entrepreneurs and the technology. The study itself was based on the following research question: How does the spin-off process contribute to the development of academic entrepreneur's social capital?

This introduction constitutes the first part of the paper. The second part presents the theoretical references used for the research, while the third section describes the methodology

used and the fourth section presents and examines the findings. The fifth and last section summarizes and discusses the main aspects of the research.

Academic spin-offs and social capital

This section presents the two main topics that form the theoretical foundation for the study: (i) academic spin-offs and (ii) the social capital of academic entrepreneurs.

Academic spin-offs

The term spin-off is used in the literature to refer to both the outcome and the process that generates that outcome. As a process, it refers to the fact that the new firm, or its entrepreneurs, or the technology used in the new venture, or all three, either left or were released by a pre-existing organization, also called the mother organization. The result of this process is a new venture, the spin-off.

Basically, an academic spin-off occurs as follows: The entrepreneurs, during their activities as students, professors or researchers at a university, acquire technological knowledge or develop a new technology that will, in the future, be used with the support of the university's business incubator (or another mechanism) to develop a product or a business concept that will be explored commercially by a new venture.

The mother organization, the entrepreneurs and the technology are the three key elements of a spin-off process (Filion, Luc and Fortin, 2003; Meyer, 2003; Pirnay, Surlemont and Nlemvo, 2003). In the case of academic spin-offs, the mother organizations are traditionally universities, but in a broader sense, all science and technology institutions can act as generators of technological spin-offs (Freitas et al., 2011; Rasmussen, 2011; Shane, 2004). Both the entrepreneur and the technology that will be used as the foundation for the new venture stem from the mother organization. The entrepreneur usually works for or studies at it. The technology used by the spin-off is taught, developed or improved by it.

Universities, however, can also give other types of support to the creation of new business ventures, beside the fact that the entrepreneurs and the technology stem from them. Examples include access to research laboratories, technology transfer offices, promotion of an entrepreneurial culture within the university, financial help, consulting sessions or courses in management and sales, office space for nascent ventures, and access to the university's network of relationships (Clarysse, Wright and de Velde, 2011; Meyer, 2003; OECD, 2001; Shane, 2004;). One of the main support tools given by universities to the spin-off process is the business incubator, where many support services can be found (Grimaldi and Grandi, 2005; Versiani and Guimarães, 2006; Wolfenbüttel, Fracasso and Bignetti, 2004).

The second key component for the spin-off process is the entrepreneur. University spin-off entrepreneurs are usually professors, researchers, or undergraduate or graduate students (Nicolaou and Birley, 2003). They may or may not leave the university after the new business venture is created. Many of them lead a double professional life, combining academic activities at the university with business activities in the new venture. However, it is also possible for a spin-off to be created by a surrogate entrepreneur (Radosevich, 1995).

In this case, the mother organization transfers the technology or provides support for the creation of the new venture, but the entrepreneur comes from outside the university. The surrogate entrepreneur can start the new venture alone or can build a partnership with the university's researchers, professors or students (Franklin and Wright, 2000).

Most technological ventures, spin-offs included, are created by a team of entrepreneurs as opposed to a single entrepreneur (Cooper and Dailly, 1997; Neergaard, 2005). In the case of academic spin-offs, these teams, rather than being composed of people from one category (professors, students or outsiders), are often made up of entrepreneurs from different categories. As a result, professors and students may well be part of the same team (Nicolau and Birley, 2003).

The third component in the spin-off process is the nature of the technology to be transferred to the new venture by the university. According to Pirnay, Surlemont and Nlemvo (2003), the knowledge transferred to a spin-off can be classified into two main groups: tacit and codified. Tacit knowledge is associated with individuals, and it is more personal, gathered over the years through experience and academic activities. In contrast, codified knowledge may belong to the university and be protected by a patent. The creation of a spin-off with patented technology is usually lengthier and

more demanding in terms of the resources needed (Pirnay, Surlemont and Nlemvo, 2003).

In their typology, Pirnay, Surlemont and Nlemvo (2003) consider only cases where the technologies in question stem from the university. They may be codified or tacit technologies, developed or learned at the university. However, in some cases the technology may originate from an organization other than the university or may even be hybrid, for example when the spin-off utilizes technology developed outside the university, but adds the university's own technological knowledge to it.

Academic entrepreneur's social capital

Adler and Kwon (2002) identified two main standpoints or perspectives used by researchers working on the concept of social capital: (i) the external perspective, where the study focuses on the external relationships of one actor; and (ii) the internal perspective, which focuses on the internal relationships of a group within the community. In this particular study, we adopt the former perspective, focusing our attention on the entrepreneur's network of contacts. A contact is an actor with whom the focal actor (or entrepreneur) has a direct connection (Lemineux and Ouimet, 2004). A contact may be an individual or an organization. Table I shows the main contacts of academic entrepreneurs.

These contacts can be classified or grouped according to the role they play or the resources they make available to the entrepreneurs (Johannisson, Ramirez-Pasillas and Karlsson, 2002; Julien, 2000; Lechner and Dowling, 2003). Examples would include the moral support network (usually family and friends), the technological network (researchers and the university), and the business network (customers, suppliers). A contact may be both a friend and a customer, or a

Family members	Customers	Other entrepreneurs
Friends	Suppliers	Organizations supporting entrepreneurship
University	Banks	Government agencies
University members	Venture capitalists	Professional and business associations
Professors and researchers	Other actors in the financial sector	
Research institutions	Consultants	
Partners	Accountants	

Table I. Main contacts of academic entrepreneurs. Sources: Aldrich and Zimmer (1986), Birley (1985), Dubini and Aldrich (1991), Hill, McGowan and Drummond (1999), Julien (2000), Pirnay (2001).

family member and an investor. As a result, some contacts may play two different roles in the entrepreneur's network (Hite, 2003; Johannisson, 1996; Uzzi, 1996). This is the case when a friend who is a researcher provides the technological entrepreneur with both moral support and technological information. Contacts are described as multiplex when they play different roles or provide the entrepreneur with different resources (Kim and Aldrich, 2005).

The social capital of entrepreneurs tends to change in size and in the diversity of the contacts in the network. In the case of size, Hansen's (2000) study of 52 new business ventures drawn from all economic sectors in the United States showed that, as a new venture is created, the number of contacts used by the entrepreneurs tends to grow. Hansen divided the process into four phases and checked the number of contacts in each phase. He found that the number of contacts increased as the process advanced: Phase 1 (7 contacts), Phase 2 (8 contacts), Phase 3 (11 contacts) and Phase 4 (12 contacts).

In the case of diversity, Perez and Sanchez (2003) in Spain and Johannisson (1998) in Sweden studied academic spin-offs and concluded that a network composed initially of scientific contacts would gradually be transformed to include business contacts.

Diversity is important because the simple fact of having more contacts in the network is not, of itself, sufficient to

benefit the entrepreneur. An increase in benefit only occurs as the contacts themselves become more diverse in terms of demographic traits, the resources they bring and the networks to which they belong (Aldrich and Carter, 2004; Aldrich, Rosen and Woodward, 1987).

Methods

The study presented in this paper was inductive, exploratory and qualitative in nature. Eight university spin-off cases were examined. The choice of this particular number of cases was the result of theoretical saturation (Eisenhardt, 1989; Strauss and Corbin, 1998) during the codification and data analysis phase. Table 2 below summarizes the methodological approach used in this research.

The eight cases examined were drawn from different technological fields and different Brazilian universities. The ventures themselves were founded between 2000 and 2003. Table 3 provides additional information about the selected cases. To ensure confidentiality, the ventures' names are fictitious.

All the cases were two to four-year-old spin-offs (at the time of data collection) and were chosen to ensure what Patton (2002) refers to as maximum variation. The key components to the spin-off basis (entrepreneur, mother organization and technology) were used to ensure the maximum variation criterion. In the variation of the entrepreneur component,

Research method	- Multiple case analysis (Eisenhardt, 1989; Yin, 2003)
Number of cases	- Eight
Criteria used in case choice	- University spin-offs two to four years-old. - Maximum variation (Patton, 2002) in the key elements of spin-offs (entrepreneur, mother organization and technology).
Data collection	- Semi-structured interviews, research notes and secondary data - 35 interviews (2 hours average): 22 with entrepreneurs/13 with managers and other incubator staff
Data analysis and interpretation	- Transcription of interviews - Interview codification and analysis with the help of the NVivo 2.0 software - Description file for each case - Analytical tables - Intra- and inter-case comparisons - Comparison with the literature

Table 2. Summary of methodological procedures.

the cases represent different types of entrepreneurs – students, professors and external entrepreneurs. In the variation of the mother organization component, the selected cases stemmed from universities and incubators that offered different research and support structures for entrepreneurship. The mother organizations in question ranged from large universities with solid, respected structures to small colleges with nascent structures. Finally, in the third component (technology), the technologies transferred to the spin-offs by the universities included both tacit and coded technologies.

To collect the data for the study, 35 semi-structured interviews were conducted, lasting an average of two hours each. Of the 35 interviews, 22 were with entrepreneurs and 13 with incubator employees (managers or other staff members). Secondary data sources (reports, advertising material, articles and the Internet) were also used to collect information on the ventures, the entrepreneurs, the universities and

the incubators. In addition, all the ventures, universities and incubators in the cases studied were visited and observed. The interview guide was structured in order to identify the characteristics of the contacts used to carry out the activities involved in the creation of the venture, as well as the origin of those contacts and the role played by the spin-off process in establishing a relationship with the contact and utilizing it.

The interviews were transcribed and submitted to the interviewees for validation. They were then coded and analyzed using the Nvivo 2.0 application. Contact categories were created during the coding process, and categories were also created to represent the contributions of the spin-off process to the entrepreneurs' social capital. The contribution categories were grouped together under three headings or mechanisms: (i) affiliation, (ii) immersion and (iii) preparation. They will be explained in more detail in the presentation and analysis of the findings.

Venture	Foundation	Business Activity	# of emp	Case variation in relation to key components in the spin-off process		
				Type of entrepreneur*	Type of mother organization**	Type of technology
Aprendiz	2003	Communication Software	3	Surrogate (2)	Low	Not patented
Freeway	2003	Software and training	13	Students (1) and surrogate (3)	Average	Not patented
Imagem	2003	Geoprocessing	0	Students (2)	Low	Not patented
Quimitech	2002	Automated systems for chemical analysis	3	Professors (3) and researchers (1)	Average	Patented
Games	2000	Computer games	6	Students (3) and surrogate (1)	High	Not patented
Sensores	2003	Optical sensors	45	Professors (2) and students (3)	High	Patented
Visitech	2003	Artificial vision systems	8	Students (2)	High	Not patented
Webdesign	2002	Websites	2	Students (2) and surrogate (1)	Low	Not patented
* -The numbers in brackets indicate the number of this type of entrepreneur among the venture creators.						
** - The classification patterns "high", "average" and "low" were defined by the researchers according to the research structure in the university (number of labs, researchers and scientific production), its reputation and the services offered to the entrepreneurs by its business incubator .						

Table 3. Cases.

The contacts used by the entrepreneurs were classified according to the network category to which they belonged (see the examples in Table 4). Where a contact was a multiplex (i.e. performing many functions), it was classified by its main function.

The analysis procedure was supported and completed by tools and techniques suggested by Miles and Huberman (1994), and included a file containing the description of each case, analytical tables and intra- and inter-case comparisons.

Findings

The spin-off process contributes to the development of academic entrepreneurs’ social capital via three mechanisms, namely (i) affiliation, (ii) immersion and (iii) preparation – in other words, the entrepreneur’s affiliation with the university, the entrepreneur’s immersion in the university’s network of relationships, and the new business venture preparation given to the entrepreneur by the university.

**First contribution mechanism:
Entrepreneur’s affiliation with the university.**

With regard to the first mechanism, affiliation, academic entrepreneurs are affiliated with their university, and are a part of it. When the entrepreneurs are students, researchers or university professors, the connection is academic in nature. When incubated, the entrepreneurs install their nascent venture inside the university’s incubator. This affiliation with the university adds to the formation of the entrepreneurial social capital because, first, it lends credibility to the entrepreneur’s project, and second, it gives the entrepreneurs preferential access to certain contacts and resources. These two aspects will be examined in the following sub-sections.

An affiliation that lends credibility to the entrepreneur’s ventures

Because universities usually have good reputations in society, academic entrepreneurs can lend credibility to their ventures by telling their contacts about their affiliation. Affiliation helps them to open doors and convince certain con-

tacts that the nascent venture and the technology it uses are credible. The nascent venture’s affiliation with the university adds credibility and makes it easier to mobilize social capital, as already demonstrated by Grandi and Grimaldi (2003), Mian (1996) and Totterman and Sten (2005).

The possibility of using the university’s credibility in early attempts to establish a business relationship with a finance provider, a customer or another contact is important to nascent ventures because they still need to build their legitimacy in the market (Delmar and Shane, 2003). This possibility is especially important to young university entrepreneurs who have few accomplishments to show when attempting to attract or convince a new contact, as illustrated by this citation from an entrepreneur:

You are not just another a small company located wherever. You can say you are located inside the university’s incubator, that you have partners, that you have the university behind you, a very strong name. [...] We used this a lot to sell our projects. The credibility of being in the university’s incubator was fundamental (Visitech)

To explore affiliation, entrepreneurs connect their image to that of the university. They mention their affiliation to their contacts. They also mention it in the promotional material they use, including leaflets and websites, where the logos of the university and the incubator are displayed.

However, not all universities enjoy the same reputation. The fact of being incubated in a university that is well-known for its research and technology transfer tends to lend more credibility to the entrepreneur’s venture than if it had been incubated in a small university that has not yet built its reputation.

An affiliation that gives entrepreneurs preferential access to certain contacts

The second contribution made by affiliation to the development of social capital is preferential access to contacts and resources, mainly within the university, but also outside it.

Category	Examples
Technological network	Professors, students, laboratories
Support network	Incubator staff, consultants, SEBRAE (Brazilian small business support agency)
Financial network	Credit agencies, banks, financial angels
Business network	Clients, suppliers, business partners
Other	Parents, other relatives

Table 4. Contact classification.

As far as the university's resources and contacts are concerned, affiliation makes it easier for the entrepreneurs to use the university's structure, and especially its technological resources (researchers and laboratories) and its new venture creation support system, primarily the business incubator inside the university

As far as contacts outside the university are concerned, some funding offers from government agencies that support innovation are reserved exclusively for ventures installed in university incubators. The nature and contributions of the affiliation factor are summarized in Table 5.

Second contribution mechanism: Entrepreneurs' immersion in the university's network of relationships.

In current language, the word immersion is used among other things to describe the introduction of an object into a container full of liquid, where it will be surrounded by that liquid. Figuratively, it could be said that a university is an environment full of contacts and that entrepreneurs, as they progress through their university years, are immersed in that environment. Immersion brings them physically closer to the university's network of relationships, allowing them to meet and interact with those contacts, as pointed out by an entrepreneur from one of the cases studied:

The incubator was located inside the T.I. Center, [...] there were many contacts, it was easy to find labour for the venture, because you were there, you see [...]. Even if it's not your intention, you make contacts when you are there. (Case Games)

As illustrated by Figure 1, some of these contacts are part of the university and incubator structure (contacts located inside the two circles), while others come from outside the university (contacts located outside the big circle).

Entrepreneurs go through two different types of immersion in the university's network, first as a university member and second as an incubatee.

Immersion as a university member

Immersion as a university member occurs when the entrepreneurs are students, teachers or professors at the university. During that time, they are involved in the university or in activities related to it on a daily basis. Consequently, they have the opportunity to meet some of the contacts who are part of the university's network, and to interact with them. During immersion as a university member, entrepreneurs build their technological network, essentially composed of members from inside the university circles (e.g. classmates' contacts, professors and university students, and research laboratories).

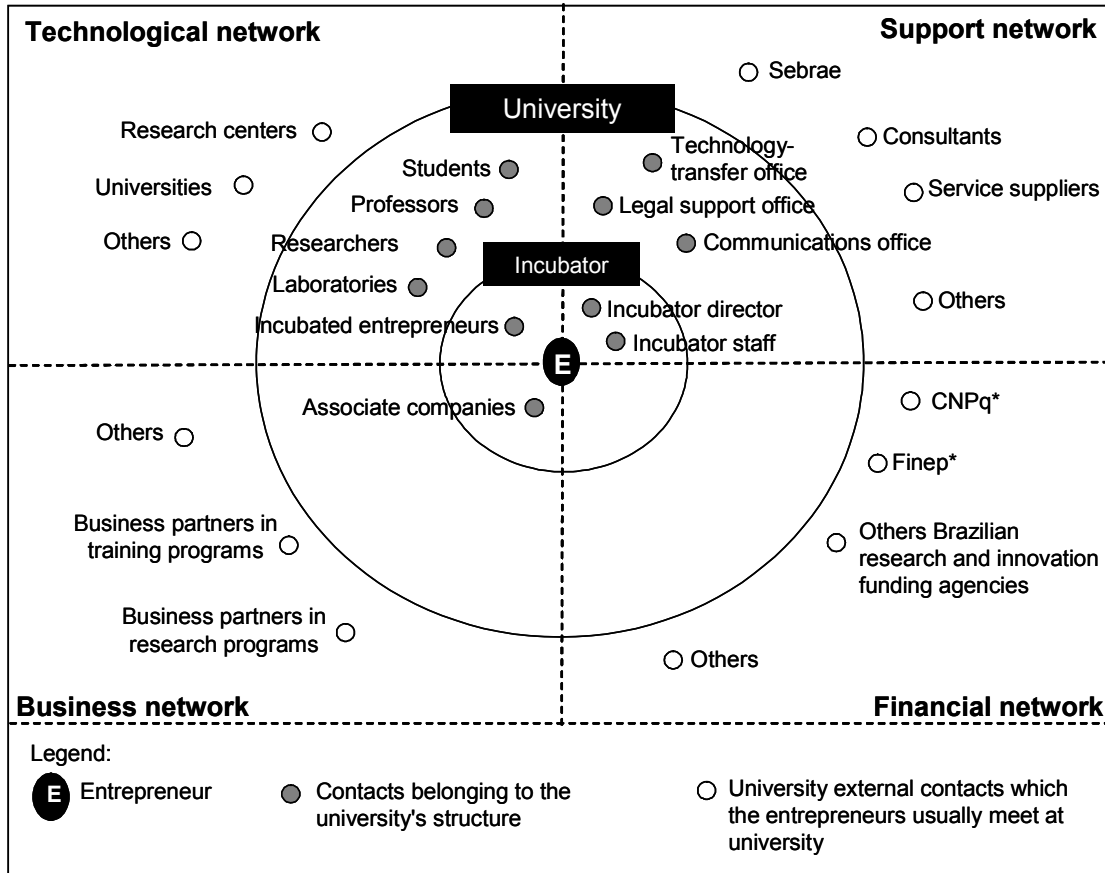
Immersion as incubatees

Immersion in the university's network of relationships continues when the venture begins to receive support from the university's business incubator. In some cases, support begins even before the nascent venture enters the incubator. With this initial support, the entrepreneur begins to benefit progressively from the new incubator environment, and is able to interact with its contacts. Proximity to the incubator and to its contacts is enhanced when the nascent venture begins to be physically incubated inside the incubator.

In the incubator, entrepreneurs share the same space with incubator staff and other incubated entrepreneurs. In addition, the incubator may be visited by foreign contacts, mainly support contacts such as consultants. Entrepreneurs also have the opportunity to get in touch with the incubator's institutional contacts inside the university, including research laboratories and the technology transfer office.

Nature of affiliation	Contribution of affiliation to the development of the entrepreneur's social capital
<ul style="list-style-type: none"> ▪ The status of university member held by entrepreneurs while they are incubated or are university members. 	<ul style="list-style-type: none"> ▪ It lends credibility to the entrepreneurs' project. It helps them to open doors and to convince contacts, especially business and financing contacts, that their venture project and technology are credible. ▪ It gives entrepreneurs preferential access to certain contacts and resources: technological resources and internal support within the university; financial resources outside it.

Table 5. Summary of the affiliation mechanism.



* Brazilian research and innovation financing agencies

Figure 1. Entrepreneurs' immersion in the university's network of relationships

Nature of immersion	Immersion contribution to the formation of entrepreneurs' social capital
<ul style="list-style-type: none"> ▪ The entrepreneur's immersion in the university's network of relationships, first as a university member, then as incubatee ▪ Immersion as a university member begins before the creation of the venture, when entrepreneurs are university students, professors or researchers ▪ Immersion as an incubatee happens during the venture creation process, when entrepreneurs receive support from the university's business incubator. 	<ul style="list-style-type: none"> ▪ Immersion provides opportunities for meetings and brings entrepreneurs into proximity with the university's network of contacts and structure. ▪ During immersion as university members, entrepreneurs mainly develop a network of technological contacts ▪ During immersion as incubatees, they develop their support network.

Table 6. Summary of the immersion mechanism.

Table 6 presents a summary of the immersion mechanism and its contributions to the social capital of academic entrepreneurs.

Third contribution mechanism: Preparation

The third contribution mechanism is preparation, which refers to the help and support given to entrepreneurs by the university – in other words, venture creation preparation for the entrepreneur and the university’s support for the initial steps of the nascent venture. Examples include courses, consulting sessions and organization or support of the entrepreneur’s attendance at events, shows and exhibitions.

These support activities are mainly carried out by the incubator, but may sometimes be promoted by other university departments too. An example of this latter possibility would be activities aimed at enhancing the value of new venture creation as a potential career path. Activities such as these take place in entrepreneurship courses and other events where students are able to meet with successful entrepreneurs.

Preparation helps to form social capital in different ways. First, it provides entrepreneurs with meeting opportunities. Second, support staff act as middlemen between entrepreneurs and other contacts. Third, preparation helps entrepreneurs to develop their social and business skills.

The creation of meeting opportunities

With regard to the creation of meeting opportunities, the support provided by the incubator allows the entrepreneur to meet with other contacts. These contacts are mostly the people and organizations that work to support nascent ventures. Examples include SEBRAE (the Brazilian small business support agency), consultants and public funding agencies. To a lesser degree, the incubator’s support also provides opportunities to meet financial contacts from the private sector, such as venture capitalists and others. The following citation by an entrepreneur describes how a training session at the incubator can help to develop social capital:

We had a management course here at the incubator. The course was offered by SEBRAE and was attended by some people from

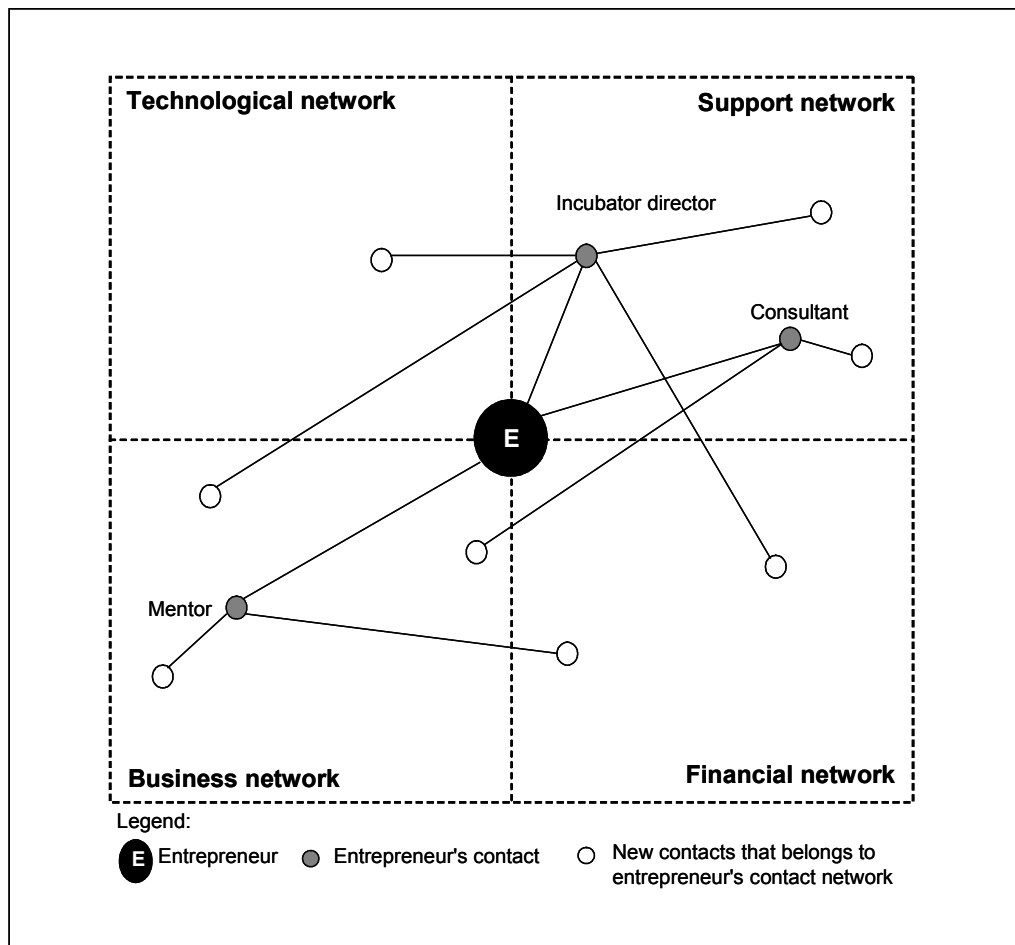


Figure 2. Support contacts as middlemen in the relationship with other contacts

State public financial agencies. And so we began to talk to them, and got know them. If we need a loan someday, we can look to someone we already met. It's easier to talk to someone you already know. (Imagem)

Entrepreneurs have the chance to meet these contacts because the incubator hires them to teach preparatory courses or give consulting sessions. Other contacts are also invited to take part in courses or events organized by the incubator. Lastly, there are the contacts that entrepreneurs meet at events held outside the university, which they attend with the incubator's help (for example, attendance at trade shows where entrepreneurs have a chance to meet potential clients).

Support people who act as middlemen between entrepreneurs and other contacts

The second contribution of preparation to social capital is derived from the liaison role played by support staff between entrepreneurs and other contacts.

Depending on the entrepreneurs' needs, the incubator employees try to find people and organizations able to respond adequately to those needs. They identify contacts and pave the entrepreneur's access to them. Both the incubator and the university introduce entrepreneurs to investors or clients who come to the university looking for service or investment opportunities.

The role of middlemen between entrepreneurs and other contacts is mainly played by the people closest to the entrepreneurs, usually the incubator's director, but possibly other incubator staff, consultants and, to a lesser degree, mentors and tutors. These people usually have contacts that will be useful to entrepreneurs and they use their credibility to pave the way for the entrepreneurs. Figure 2 illustrates

the middleman role played by support employees between entrepreneurs and other contacts.

The development of social and business skills

The third contribution of preparation to social capital is the development of the entrepreneur's social and business skills.

With regard to social skills, the courses or consulting sessions offered to entrepreneurs by the university or the incubator contribute to the development of their communication skills and their relationships with other individuals (Albornoz, 2008). Social skills, as demonstrated by Baron (2004) and Baron and Markman (2003), help entrepreneurs to use their social capital.

In addition to traditional courses and consulting sessions, some incubators offer support activities focused on the development of social skills. For example, in the case of Web-design, a psychologist from the incubator offers individual or group activities to the entrepreneurs in order to help them improve the quality of their relationships with other people inside or outside the incubator.

Business skills can help entrepreneurs to create their social capital in two different ways. First, by developing their business skills, entrepreneurs can better estimate their need for social capital and find the best way to use it.

Second, business skills help entrepreneurs to develop their cognitive proximity to business contacts. The way academic entrepreneurs think at the beginning of the new venture creation process is essentially connected to the technological world in which they live. As they develop their business skills, however, they begin to understand the business sector itself, the interactions between the actors working in that sector, and the language they use to communicate.

Nature of preparation	Contribution of preparation to the formation of entrepreneurs' social capital
<ul style="list-style-type: none"> ▪ University and incubator follow-up and support given to the entrepreneur ▪ Occurs during entrepreneurship courses, consulting sessions and other support and validation activities for entrepreneurship. ▪ The entrepreneur's preparation may begin even before admission to incubation, but happens mostly during the incubation. 	<ul style="list-style-type: none"> ▪ Offers meeting opportunities for entrepreneurs. ▪ Support staff act as middlemen between entrepreneurs and other contacts. ▪ Preparation helps entrepreneurs to develop social and business skills. ▪ Preparation helps entrepreneurs to develop their support and financial networks. To a lesser degree, it also helps them to develop their business networks.

Table 7. Summary of preparation mechanism.

The development of this cognitive proximity with the business world is significant because one of the factors that favours the mobilization of social capital is cognitive proximity to the contacts one wishes to use (Torres, 1998, 2007). Table 7 summarizes the preparation mechanism and its contributions to social capital.

Discussion and conclusion

To look at how the spin-off process contributes to the development of academic entrepreneur's social capital, we carried out an inductive, exploratory and qualitative multi-case study (Yin, 2003) in which we analyzed eight Brazilian academic spin-off cases.

We proposed three mechanisms to explain the contribution of the spin-off process to the development of academic entrepreneurs' social capital, namely (i) affiliation, (ii) immersion and (iii) preparation – in other words, the entrepreneurs' affiliation with a university, their immersion in the university's network of relationships and the venture creation preparation offered to entrepreneurs by the university.

Through these mechanisms, the spin-off process provides the entrepreneurs with certain opportunities and privileges in the development of social capital. First, it gives them preferential access to certain resources and contacts. Second, it lends credibility to their ventures. Third, it provides meeting opportunities for entrepreneurs and brings them into proximity with other actors. Fourth, it helps to develop entrepreneurs' social and business skills, and these skills, in turn, help them to use contacts for the benefit of the nascent venture.

Our findings are consistent with the opinions of other authors who indicate that the spin-off process can favour the development of entrepreneurs' social capital (Filion, Luc and Fortin, 2003; Grandi and Grimaldi, 2003; Shane, 2004; Totterman and Sten, 2005). However, it is also possible to find authors in the literature who found that university incubators and other university support mechanisms for entrepreneurs do not necessarily make it easier for academic entrepreneurs to transition from a mostly technological network to a business network (Chabaud, Ehlinger, and Perret, 2003; Karim and Sammut, 2007; Totterman and Sten, 2005).

In fact, when analyzing the case studies, we realized that the universities and their business incubators contribute significantly to the constitution of technological, support, and financial networks, but much less to the development of business networks – precisely the kind of networks that are fundamental to the success of the new venture.

Three factors may explain why the spin-off process fails to develop a significant business network. The first factor is

that the college environment in which the entrepreneurs are immersed is constituted primarily of technological contacts, with very few business contacts. As a result, in their daily activities at the university, entrepreneurs hardly ever meet business contacts. The possibility of obtaining this type of contact in the college environment, of being close to it and of interacting with it, is a key factor in establishing relationships and using them for the benefit of the new venture (Johannisson, 1998; Torres, 1998).

The second factor is that most incubator directors and staff members have few, if any, contacts in the business sector. Given that most of them come from academic circles, their networks are composed mainly of technological, support and funding contacts. A similar situation was observed by Totterman and Sten (2005) and Chabaud, Ehlinger and Perret (2003). These authors studied incubators in Finland and France respectively. Incubator directors and other staff members are essential to the development of entrepreneurs' networks. They are important middlemen between the entrepreneurs and other networks. To increase the chances of entrepreneurs developing a business network, universities should hire support staff with better connections in the business sector.

The third factor that hinders the contribution of the spin-off process to the creation of networks is that there are very few activities focusing specifically on the development of social capital (e.g. training sessions on social skills and networking). A study of 169 incubators carried out by Hansen et al. (2000) found that only 26% of the sample actually offered services focused specifically on network development. This impoverished supply of social capital development activities is contrary to the recommendations of many authors, who have emphasized that spin-off support services, including incubation, should give priority to the creation of networks (Carayannis and von Zedtwitz, 2005; Hansen et al., 2000; Hughes, Ireland, and Morgan, 2007; Hussler and Ronde, 2009; Totterman and Sten, 2005; Walter, Auer and Ritter, 2006).

In short, if universities wish to improve the contribution of the spin-off process to the development of academic entrepreneur's social capital, they should increase the number of business contacts in their environments, hire people with connections in the business sector to support nascent entrepreneurs, and provide entrepreneurs with more structured services aiming at developing their social capital.

References

- ADLER, P. S., Kwon, S.W. (2002). Social capital: prospects for a new concept. *Academy of Management Review*, 27(1), 17-40.
- ALBORNOZ, C. (2008). Toward a Set of Trainable Content on Entrepreneurship Education: A Review of Entrepreneurship Research from an Educational Perspective. *Journal of Technology Management & Innovation*, 3(2), 86-98.
- ALDRICH, H., Carter, N. M. (2004). Social networks. In: Gartner, W. B., Shaver, K. G., Carter, N. M., Reynolds, P. D. (Eds.), *Handbook of entrepreneurial dynamics: the process of business creation*. Sage, Thousand Oaks. pp. 324-335.
- ALDRICH, H., Rosen, B., Woodward, W. (1987). The impact of social networks on business foundings and profit: a longitudinal study. In: Churchill, N. C., Hornaday, J.A., Kirchoff, B., A., Krasner, J., Vesper, K. H. (Eds.), *Frontiers of Entrepreneurship Research 1987*. Babson College, Wellesley. pp. 154-168.
- ALDRICH, H., Zimmer, C. (1986). Entrepreneurship through social networks. In: Sexton, D. L., Smilor, R. W. (Eds.), *The Art and science of entrepreneurship*. Ballinger, Cambridge. pp. 3-23.
- ANDERSON, A.; Park, J.; Jack, S. (2007) Entrepreneurial Social Capital: Conceptualizing Social Capital in New High-tech Firms. *International Small Business Journal*, 25(3), 245-269.
- AUDRETSCH D., Aldridge T., Sanders M. (2011), Social Capital Building and New Business Formation: A Case Study in Silicon Valley, *International Small Business Journal*, 29(2) 152-169.
- BARON, R.A. (2004). Social skills. In: Gartner, W. B., Shaver, K. G., Carter, N. M., Reynolds, P. D. (Eds.), *Handbook of entrepreneurial dynamics: the process of business creation*. Sage, Thousand Oaks. pp. 220-233.
- BARON, R.A., Markman, G. D. (2003). Beyond social capital: the role of entrepreneurs' social competence in their financial success. *Journal of Business Venturing*, 18(1), 41-60.
- BIRLEY, S. (1985). The role of networks in the entrepreneurial process. *Journal of Business Venturing*, 1(1), 107-117.
- BOURDIEU, P. (1986). The forms of capital. In: Richardson, J. G. (Ed.), *Handbook of theory and research for the sociology of education*. Greenwood Press, Westport. pp. 241-258.
- CARAYANNIS, E. G., von Zedtwitz, M. (2005). Architecting gloCal (global-local), real-virtual incubator networks (GRVINS) as catalysts and accelerators of entrepreneurship in transitioning and developing economies: lessons learned and best practices from current development and business incubation practices. *Technovation*, 25(2), 95-110.
- CHABAUD, D., Ehlinger, S., Perret, V. (2003). Les incubateurs d'entreprises innovantes: un réseau entrepreneurial reconfiguré? Paper presented at the XIIème Conférence de l'Association International de Management Stratégique, Les côtes de Carthage.
- CHANDRA, A., Silva, M. (2012). Business Incubation in Chile: Development, Financing and Financial Services. *Journal of Technology Management & Innovation*, 7(2), 1-13.
- CLARYSSE, B., Wright, M., de Velde, E. (2011). Entrepreneurial Origin, Technological Knowledge, and the Growth of Spin-Off Companies. *Journal of Management Studies*, 48(6), 1420-1442.
- COOPER, A. C., Dailly, C. M. (1997). Entrepreneurial Teams. In: Sexton, D., Smilor, R. W. (Eds.), *Entrepreneurship 2000*. Upstart, Chicago. pp. 167-188
- DAVIDSSON, P., Honig, B. (2003). The role of social and human capital among nascent entrepreneurs. *Journal of Business Venturing*, 18(3), 301-331.
- DELMAR, F. Shane, S. (2003). Does business planning facilitate the development of new ventures? *Strategic Management Journal*, 24(12), 1165-1185.
- DUBINI, P., Aldrich, H. (1991). Personal and extended networks are central to the entrepreneurial process. *Journal of Business Venturing*, 6(5), 305-313.
- EISENHARDT, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.
- FERRARO, F. (2003). Raising capital: Relational practices and social capital in Silicon Valley entrepreneurship. Unpublished Ph.D. Thesis, Stanford University, United States -- California.
- FILION, L. J., Luc, D., Fortin, P.A. (2003). L'essaimage d'entreprises - Vers de nouvelles pratiques entrepreneuriales. Les Éditions Transcontinental, Montreal.
- FRANKLIN, S., Wright, M. (2000). University spin-out companies: academic and surrogate entrepreneurs. In: Daring, W., Oakey, R. P., Kipling, M. (Eds.), *New Technology-Based Firms at the Turn of the Century*. Pergamon, Amsterdam. pp. 35-49.

- FREITAS, J., Gonçalves, C., Cheng, L., Muniz, R. (2011). Parsimonious Determinants of Pre-Incubated Academic Spin-Offs Initial Performance: a Configurational Perspective. *Journal of Technology Management & Innovation*, 6(2), 50-65.
- GRANDI, A., Grimaldi, R. (2003). Exploring the networking characteristics of new venture founding teams. *Small Business Economics*, 21(4), 329-341.
- GRIMALDI, R., Grandi, A. (2005). Business incubators and new venture creation: an assessment of incubating models. *Technovation*, 25(2), 111-121.
- HANSEN, E. L. (2000). Resource acquisition as a startup process: initial stocks of social capital and organizational findings. In: Reynolds, P. D., Autio, E., Brush, C. G., Bygrave, W. D., Manigart, S., Sapienza, H. J., Shaver, K. G. (Eds.), *Frontiers of Entrepreneurship Research 2000*. Babson College, Wellesley.
- HANSEN, M. T., Chesbrough, H. W., Nohria, N., Sull, D. N. (2000). Networked incubators: Hothouses of the new economy. *Harvard Business Review*, 78(5), 74-84.
- HILL, J., McGowan, P., Drummond, P. (1999). The development and application of a qualitative approach to researching the marketing networks of small firm entrepreneurs. *Qualitative Market Research*, 2(2), 71-81.
- HITE, J. M. (2003). Patterns of multidimensionality among embedded network ties: a typology of relational embeddedness in emerging entrepreneurial firms. *Strategic Organization*, 1(1), 9-49.
- HUGHES, M., Ireland, R. D., Morgan, R. E. (2007). Stimulating Dynamic Value: Social Capital and Business Incubation as a Pathway to Competitive Success. *Long Range Planning*, 40(2), 154-177.
- HUSSLER, C., Ronde, P. (2009). Investing in Networking Competences or Establishing in Hot Spots?. *The Innovation Dilemma. Journal of Technology Management & Innovation*, 4(4), 1-13.
- JOHANNISSON, B. (1996). The dynamics of entrepreneurial networks. In: Reynolds, P. D., Birley, S. J., Butler, E., Bygrave, W. D., Davidsson, P., Gartner, W. B., McDougall, P. P. (Eds.), *Frontiers of Entrepreneurship Research 1996*. Babson College, Wellesley. pp. 253-267.
- JOHANNISSON, B. (1998). Personal networks in emerging knowledge-based firms: Spatial and functional patterns. *Entrepreneurship & Regional Development*, 10(4), 297-312.
- JOHANNISSON, B., Ramirez-Pasillas, M., Karlsson, G. (2002). The institutional embeddedness of local inter-firm networks: A leverage for business creation. *Entrepreneurship and Regional Development*, 14(4), 297-315.
- JULIEN, P.A. (2000). L'entrepreneuriat au Québec - Pour une révolution tranquille entrepreneurial 1980-2005. Les Éditions Transcontinental, Montreal.
- KARIM, M., Sammut, S. (2007). Processus entrepreneurial et pépinières d'entreprises: quand l'accompagnement conduit à l'isolement. Paper presented at the XVIème Conférence de l'Association Internationale de Management Stratégique, Montréal.
- KIM, P. H., Aldrich, H. E. (2005). *Social capital and entrepreneurship*. Now, Boston.
- LECHNER, C., Dowling, M. (2003). Firm networks: external relationships as sources for the growth and competitiveness of entrepreneurial firms. *Entrepreneurship and Regional Development*, 15(1), 1-26.
- LEMIEUX, V., Ouimet, M. (2004). *L'analyse structurale des réseaux sociaux*. Presses de l'Université Laval, Québec.
- LIAO, J., Welsch, H. (2002). The temporal patterns of venture creation process: an exploratory study In: Bygrave, W. D., Brush, C. G., Davidsson, P., Fiet, J., Greene, P. G., Harrison, R. T., Lerner, M., Meyer, G. D., Sohl, J., Zacharakis, A. (Eds.), *Frontiers of Entrepreneurship Research 2002*. Babson College, Wellesley.
- MEYER, M. (2003). Academic entrepreneurs or entrepreneurial academics? Research-based ventures and public support mechanisms. *R&D Management*, 33(2), 107-115.
- MIAN, S. A. (1996). Assessing value-added contributions of university technology business incubators to tenant firms. *Research Policy*, 25(3), 325-335.
- MILES, M. B., Huberman, A. M. (1994). *Qualitative data analysis: an expanded sourcebook* (2nd ed.). Sage, Thousand Oaks.
- MURRAY, F. (2004). The role of academic inventors in entrepreneurial firms: sharing the laboratory life. *Research Policy*, 33(4), 643-659.
- NEERGAARD, H. (2005). Networking activities in technology-based entrepreneurial teams. *International Small Business Journal*, 23(3), 257-278.
- NEERGAARD, H., Madsen, H. (2004). Knowledge intensive entrepreneurship in a social capital perspective. *Journal of Enterprising Culture*, 12(2), 105-125.

- NICOLAOU, N., Birley, S. (2003). Academic networks in a trichotomous categorisation of university spinouts. *Journal of Business Venturing*, 18(3), 333-359.
- ORGANISATION de coopération et de développement économiques - OCDE. (2001). Special issue on fostering high-tech spin-offs: a public strategy for Innovation. Organisation for Economic Co-operation and Development, Paris.
- PATTON, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Sage, Thousand Oaks.
- PEREZ, M. P., & Sanchez, A. M. (2003). The development of university spin-offs: early dynamics of technology transfer and networking. *Technovation*, 23(10), 823-831.
- PIRNAY, F. (2001). La valorisation économique des résultats de recherche universitaire par création d'activités nouvelles (spin-offs universitaires): Proposition d'un cadre procedural d'essaiimage. Unpublished Ph.D. Thesis, Université du Driot et de la Santé - Lille 2.
- PIRNAY, F., Surlémont, B., Nlemvo, F. (2003). Toward a typology of university spin-offs. *Small Business Economics*, 21(4), 355-369.
- RADOSEVICH, R. (1995). A model for entrepreneurial spin-offs from public technology sources. *International Journal of Technology Management*, 10(7/8), 879-893.
- RASMUSSEN, E. (2011). Understanding Academic entrepreneurship: exploring the emergence of university spin-off ventures using process theories. *International Small Business Journal*, 29(5) 448-471
- SHANE, S. (2004). *Academic entrepreneurship: university spinoffs and wealth creation*. Elgar, Cheltenham.
- STRAUSS, A. L., Corbin, J. M. (1998). *Basics of qualitative research: techniques and procedures for developing grounded theory* (2nd ed.). Sage, Thousand Oaks.
- TORRÈS, O. (1998). *PME: de nouvelles approches*. Economica, Paris.
- TORRÈS, O. (2007). Approche explicative du comportement caractéristique des PME: le principe proxémique. In: Filion, L. J. (Ed.), *Management des PME - De la création à la croissance*. ERPI, Saint-Laurent. pp. 35-46
- TOTTERMAN, H., Sten, J. (2005). Start-ups: business incubation and social capital. *International Small Business Journal*, 23(5), 487-511.
- UZZI, B. (1996). The sources and consequences of embeddedness for the economic performance of organizations: the network effect. *American Sociological Review*, 61(4), 674-698.
- UZUNCA, B. (2011). Comparative Advantages of Spinoff Firms: An Evolutionary Perspective. *Journal of Technology Management & Innovation*, 6(4), 80-92.
- VERSIANI, A., Guimaraes, L. (2006). Creation of technologically-based firms in Brazil: the influence of incubators on the set-up of new business. *Revista Eletrônica de Administração*, 12(3), 1-23.
- WALTER, A., Auer, M., Ritter, T. (2006). The impact of network capabilities and entrepreneurial orientation on university spin-off performance. *Journal of Business Venturing*, 21(4), 541-567.
- WOLFFENBÜTTEL, A., Fracasso, E., Bignetti, L. (2004). The university-firms interaction process in a university incubator: the case of the Vale do Rio dos Sinos University's incubator. *Revista Eletrônica de Administração*, 10(1), 1-19.
- YIN, R. K. (2003). *Case study research: design and methods* (3rd ed.). Sage, Thousand Oaks.