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Spinoffs and their endowments: beyond knowledge inheritance theory

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Abstract

Purpose – The purpose of this paper is to integrate knowledge inheritance theory with the social capital perspective to explain the initial endowments of spinoffs.

Design/methodology/approach – The authors maintain that social capital plays a crucial part, both as a mechanism supporting the generation of intellectual capital prior to a spinoff's foundation, and as an endowment that complements this capital once the spinoff is founded. Knowledge inheritance remains a fundamental mechanism for the formation of a spinoff's intellectual capital. Its other endowment, social capital, derives from three types of relationship that future entrepreneurs develop within, through and outside their parent firm, all three of which are crucial to the formation of a spinoff's intellectual capital.

Findings – The first result of the theoretical research is an integrative framework of a spinoff's endowments. Moreover, the authors apply this framework to address two key research questions in the spinoff literature, i.e. whether spinoffs can differ from their parents in terms of intellectual capital; and why spinoffs tend to co-locate near their parents, in geographical clusters. The integrative approach helps to tackle these questions.

Originality/value – This conceptual paper offers a more comprehensive explanation of the emergence of spinoffs in terms of their initial endowments than the knowledge inheritance theory.

Keywords Social capital, Entrepreneurship, Intellectual capital, Geographical clusters, Knowledge inheritance, Spinoffs

Paper type Conceptual paper

1. Introduction

Among *de novo* firms, i.e. new ventures that are legally separated from other companies (Helfat and Lieberman, 2002), spinoffs are consistently more successful in terms of survival, growth, innovation, and other performance measures (Agarwal *et al.*, 2004; Klepper and Sleeper, 2005; Chatterji, 2009; Dahl and Sorenson, 2014). To explain their superior performance, scholars suggest that spinoffs benefit from the industry-specific knowledge that their founders gained in their previous employment. Based on this assumption, Klepper and Sleeper (2005) advance a theory of knowledge inheritance moving from the premise that "spinoffs inherit knowledge from their parents that shapes their nature at birth" (p. 1291). In other words, the initial endowment explaining the superiority of spinoffs is the intellectual capital that founders inherit from their parent firms. For example, founders of spinoffs may have access to innovation developed by their previous employer, or a better understanding of the routines and blueprints that work well in a given industry (Dahl and Sorenson, 2014).

While knowledge inheritance theory has received broad support from empirical research, the majority of studies do not provide specific information on knowledge transfers between parents and spinoffs. The few exceptions report that spinoffs outperform other startups even after controlling for their inherited knowledge (Dahl and Sorenson, 2014). This means that other mechanisms, neglected by the mainstream literature on knowledge inheritance, must be driving the spinoffs' superiority.

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As Sorenson and Audia (2000) maintain, potential entrepreneurs with prior industry-specific experience are more likely to develop social connections that help them, for instance, to identify and recruit suitable employees for their ventures. This and other studies suggest that, in addition to their intellectual capital, spinoff founders also develop a social capital before entering the market that might contribute to explaining why they outperform other start-ups. This impression is supported by an abundance of papers in the entrepreneurship literature showing how social connections help new founders to gain business knowledge, access to scarce resources, and develop self-confidence. As Helfat and Peteraf (2003) argue, new-to-the-world organizations begin with a set of endowments of which intellectual capital (knowledge, skills, and experience) and social capital (social ties inside and outside the team) are the main components.

Oddly enough, literature lacks a framework that integrates knowledge inheritance theory with the social capital perspective to explain the initial endowments of spinoffs. This paper intends to contribute to the literature on spinoffs by proposing such a framework. This study maintains that social capital plays a crucial part, both as a mechanism supporting the generation of intellectual capital before a spinoff is founded, and as an endowment that complements this intellectual capital at their foundation. On the one hand, during the pre-entry period potential entrepreneurs develop social capital (within, through, and outside the parent firm) that help them to develop additional intellectual capital beyond the intellectual capital they inherit from the parents. On the other hand, social capital of founders complements their intellectual capital at the time of foundation.

The integrative framework offers a more comprehensive explanation of the emergence of spinoffs in terms of their initial endowments than the knowledge inheritance theory. In particular, knowledge inheritance theory is unable to fully explain two research questions that have attracted the attention of numerous spinoff scholars.

The first research question is:

RQ1. Whether spinoffs can differ from their parents in terms of intellectual capital.

As implied by the study of Agarwal *et al.* (2004), successful spinoffs have to acquire market or technological knowledge beyond what the founders can inherit from the parent firm. On the contrary, knowledge inheritance theory tends to over-simplify reality positing that all spinoffs inherit their intellectual capital only from their parents.

The second research question is:

RQ2. Why spinoffs tend to co-locate near their parents, in geographical clusters.

Knowledge inheritance theory explains this phenomenon drawing on a genetic inertial factor that lead spinoffs to locate close to their parents. However, to explain the spinoff's co-location, "genetics" is not enough as recently argued by Boschma (2015).

The integrative framework helps to tackle these questions more effectively, providing answers that stem from the interplay between knowledge inheritance and social capital, both prior to a spinoff's market entry and at the time of its foundation.

2. Intellectual capital and spinoffs' endowments

As knowledge inheritance theory posits, the main endowment that a spinoff possesses at the time of its foundation is its intellectual capital, defined as the knowledge and knowing capability of an organization (Nahapiet and Ghoshal, 1998), which it inherits from its parent.

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In the literature there exists a variety of definitions and conceptualizations of human and intellectual capital (Martin-de Castro, 2014; Choong, 2008). Although the prevailing distinction regards human capital as the knowledge and expertise of individuals while intellectual capital as all the knowledge and intellectual assets possessed by the firm (Stewart, 1997; Martin-de Castro, 2014), this paper uses the term intellectual capital to indicate the knowledge, skills and cognition of the founders of the spinoff. This is due to the fact that, since this paper studies new ventures (i.e. the spinoffs at their foundation), the skills and knowledge, skills and cognition of the funders tend to correspond to the intellectual assets of the firms they are founding (Helfat and Peteraf, 2003).

Knowledge inheritance theory sees intellectual capital as the industrial counterpart of genes (Klepper and Sleeper, 2005) that are transferred to the progeny through a linear hereditary process. The parent company serves as a source of knowledge that is absorbed, to some degree at least, by one or more employees with the necessary capacity for absorption. In the final act, these employees become separated from the parent firm and act as carriers, bringing the knowledge they have absorbed to the spinoffs.

The leading author on knowledge inheritance theory is Steven Klepper, who wrote two seminal contributions at the beginning of the last decade. In his first paper, Klepper (2001) lays the foundations of knowledge inheritance theory, recognizing that what employees learn at the parent companies is the key factor in the formation of spinoffs. His second contribution (Klepper, 2002) is an in-depth empirical study of numerous new entrants in the automotive industry in the USA between 1895 and 1966. What emerges from this study is that the new entrants best equipped to deal with competition were those founded by people who had gained a lengthy experience of working within the leading companies in the industry.

Studies on spinoffs, and more generally on the knowledge inheritance process, have been proliferating in the last decade or so, spanning different sectors and countries (Klepper, 2009). These studies have given priority to modern and high-tech industries, such as those manufacturing semiconductors (Klepper, 2010), disk drives (Agarwal *et al.*, 2004; McKendrick *et al.*, 2009), lasers (Klepper and Sleeper, 2005; Buenstorf, 2007), and medical devices (Chatterji, 2009). All the publications on this line of research share the same conceptual approach. Spinoffs are essentially seen as the way in which knowledge is transferred from the parent (incubator) firm to the new venture. The emphasis is on the knowledge that the spinoff's founder gains at the parent company, and then transfers to the newborn firm. Spinoffs are the product of a process of reproduction in which genes (i.e. knowledge and routines) are transmitted from the parent to the child. There is no pooling of different sets of genes in this process; the hereditary mechanism is interpreted as a sort of "automatism." The literature on this topic focusses particularly on intra-industry spinoffs, disregarding the cases where ex-employees found new ventures in a different industry. The parent's genes are only effective in the original environment, in the industry where their child has been nurtured. This inheritance mechanism explains why spinoffs normally perform better than other start-ups, in terms of survival rates and other performance measures (Klepper, 2001; Agarwal *et al.*, 2004; Dahl and Reichstein, 2007; Eriksson and Kuhn, 2006). Spinoffs can benefit from the industry-specific knowledge and experience of their founders, who can take a holistic cross-functional approach to the business and have an explicit incentive and the motivation to transform their knowledge into best practices. Other start-ups lack such industry-specific knowledge and have to learn by trial and

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error, or through "indirect grafts, such as recruiting employees who work in the relevant industry" (Agarwal *et al.*, 2004, p. 506).

The genetic logic behind knowledge inheritance theory also explains why researchers have paid particular attention to linking the features of parents with the likelihood of their generating spinoffs or with the performance of the latter. These features are considered as a proxy of the parent's reproductive capacity or the quality of its genes and, as a consequence, of the performance of any spinoffs.

It is common to find that the best-performing firms, in terms of longevity or market share growth, are those spawning more, and more durable spinoffs (Agarwal *et al.*, 2004; Dahl and Reichstein, 2007; Eriksson and Kuhn, 2006). This indirectly confirms the existence of a hereditary mechanism. The best-performing parents presumably have more and better-quality genes, which improve their chances of reproduction and the survival prospects of their progeny. It is argued that employees working in leading and best-performing enterprises are in a more favorable position for absorbing knowledge that could be useful in any autonomous entrepreneurial efforts. Spinoffs also normally develop variants of their parents' products (especially if such variants do not cannibalize the parents' products). Since spinoffs inherit their knowledge from their parents, they tend to produce goods that are similar but do not wholly overlap the parents' offering (Klepper, 2009).

3. Social capital and spinoffs' endowments

The main argument developed in this paper is that knowledge inheritance theory neglects the important contribution of social capital to a spinoff's endowments. Social capital is the sum of the resources embedded within, available through, and derived from the network of relationships possessed by an individual or an organization (Nahapiet and Ghoshal, 1998; Nordstrom and Steier, 2015). But it is also the process of creating a condition for the effective access to these resources (Anderson and Jack, 2002; Furlan and Grandinetti, 2011).

Even if there are some authors that consider the inter-organizational relationships as part of intellectual capital of the firm (Martin-de Castro, 2014), this paper distinguishes the intellectual capital (i.e. knowledge and skills possessed by the founders) from the social capital that concerns the resources associated to the network of relationships of the founders. Consistently with this view, this study maintains that the social capital of the future entrepreneur can be seen both as a mechanism supporting the generation of intellectual capital before the spinoff's foundation and as an endowment that complements this intellectual capital when the spinoff is founded. The next two subsections deal with these two topics in turn.

3.1 Social capital as a means for creating intellectual capital

The relationship between social capital and intellectual capital has been widely studied in the case of established firms. Adner and Helfat (2003, p. 1022) suggest that "a manager's social capital affects the manager's human capital by providing information that augments his or her knowledge base." Burt (1997) maintains that social capital enables managers to identify promising opportunities. Nahapiet and Ghoshal (1998) likewise argue that social capital facilitates the creation of new intellectual capital and that it is the interaction between social and intellectual capital that underpins a firm's organizational advantage. On the whole, these seminal contributions provide the grounds for a good number of empirical and conceptual studies on the relationship between social and intellectual capital in established firms.

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The relationship between the social and intellectual capital of nascent firms has been less well explored. Little is known about how the social and intellectual capital of the future entrepreneur interact during the period before the new business is founded. In particular, research lacks specific studies on this relationship in spinoffs because most of the entrepreneurship literature does not distinguish between spinoffs and other types of *de novo* venture (Helfat and Lieberman, 2002).

Some insights can nonetheless be gleaned from studies on the interplay between new ventures and their founders' social capital. Specifically, this study focusses on those contributions that: consider the period preceding the foundation of new ventures; and analyze how the future entrepreneurs' social capital contributes to the formation of their intellectual capital.

One of the earliest contributors on this issue is Johannisson (1988), who studies a number of different new ventures, from those founded by people with no prior work experience to those established by white-collar workers leaving their employment to set up a separate firm that complements their previous employer's business. The author argues that the key to entrepreneurial success lies in the entrepreneurs' ability to develop and maintain a personal network that helps them to broaden their entrepreneurial knowledge even before their new venture is founded. Another seminal contribution comes from Birley (1985) on how future entrepreneurs' interpersonal relationships sustain the assembling of the resources they need to start up the business. Birley's research covers the firms founded in St Joseph County (Indiana, USA) over a period of five years, considering the entrepreneurs' formal relationships (e.g. with banks, accountants, or public institutions), and their informal networks (family, friends, business contacts). The results show that most of the help in assembling the necessary resources (e.g. supplies, equipment, space, employees, orders, and money) comes from the latter, informal relations, and primarily from previous colleagues. The author argues that, by interacting with "knowledgeable others," future entrepreneurs develop, fine tune or modify their original business ideas to enhance their feasibility. Their networking is iterative in nature and this iteration is the core of the learning process.

Several other conceptual and empirical studies confirm the cognitive role of future entrepreneurs' social capital in their ability to identify profitable business opportunities. Authors have highlighted how innovative clients and lead users may provide information on how to improve existing products or services, or insight on nascent needs. As an example, Shane (2000, p. 452) describes the case of entrepreneurs who start new companies "to solve customer problems that they learned from working with users in their previous employment." Other entrepreneurs may provide useful connections too. For instance, Ramos-Rodriguez *et al.* (2010) show that individuals who know and interact with local entrepreneurs are more likely to recognize good opportunities for starting a new business in the area where they live than the rest of the population.

Broadening the perspective to a wider set of relationships, Elfring and Hulsing (2003) distinguish between weak and strong ties (Granovetter, 1973) to see how the discovery of business opportunities is influenced by the future entrepreneur's social capital. After their exploratory case-based research on high-tech start-ups, the authors hypothesize that weak ties lead to a more varied set of information and knowledge sources, and are more effective than strong ties in supporting incremental innovations, while strong ties are more important for ventures pursuing radical innovations. Stuart and Sorenson (2007) also consider the difference between strong and weak ties, and emphasize the role of the latter. Given that weak ties can be very numerous, would-be

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entrepreneurs with broader networks are more likely to encounter promising opportunities, and found new ventures more frequently. The authors conclude that cognitive heterogeneity, or non-redundancy among networks, amplifies the chances of opportunities being recognized (Renzulli *et al.*, 2000).

While most of the studies considered here focus on opportunity recognition, social capital is also important to the formation of future entrepreneurs' intellectual capital even before they have an idea for a new business. Stuart and Ding (2006) examine the conditions prompting university-employed life scientists to become entrepreneurs, and maintain that scientists are more likely to become entrepreneurs when they are affiliated to universities employing other academic entrepreneurs, or when they coauthor research with academic entrepreneurs working at other universities. Both networks can provide scientists with information and knowledge that might ultimately lead to the foundation of a new firm. This learning process might take a very long time and start well before a business opportunity is identified (Stuart and Ding, 2006). Similarly, Furlan and Grandinetti (2014) consider the emergence of spinoffs as the final stage of a longer period of incubation spent by the future entrepreneur with the parent company. During the earlier stages of this period, future entrepreneurs (who are still without a business idea) interact with a broad array of people (colleagues working at the parent company, individuals operating at other firms doing business with the parent, and individuals in purely social contexts), and through these interactions they learn technological, marketing, and organizational know – how that helps them to recognize an opportunity. More generally, they build up the intellectual capital that they will bring to their new firms.

3.2 Endowing spinoffs with social capital

The entrepreneurship literature has long discussed and demonstrated the importance of social capital in assembling the resources for a new venture and enhancing its chances of survival and performance (Aldrich *et al.*, 1987; Hansen, 1995; Ostgaard and Birley, 1996; Dahl and Sorenson, 2014). Interpersonal relationships are both a means through which a founder access resources (cognitive, financial, or otherwise) that are necessary to start the business and a source of legitimacy that often new ventures lack due to their liability of newness (Stinchcombe, 1965).

Like the relationship between social and intellectual capital analyzed in the previous subsection, however, how a spinoff's social capital is developed in the pre-entry period has been less thoroughly assessed. Some useful insight can be drawn from studies that explicitly or implicitly consider the parent companies as the setting where future entrepreneurs develop relationships that they can exploit when setting up a new venture.

Some authors acknowledge that new ventures can benefit from relationships with potential customers that founders bring with them from their parent company (Fichman and Levinthal, 1991; Levinthal and Myatt, 1994). According to Fichman and Levinthal (1991), this type of endowment affords new ventures a "honeymoon period." The new organizations benefit from an initial stock of relational assets (goodwill, trust, psychological commitment) that has been developed over time through interactions between customers and parent firms. Because they trust a spinoff's founder, some customers may decide to leave the parent company and start doing business with the new firm.

Apart from their relationships with the parent company's customers, other connections that the founders will have established in their previous jobs may become valuable components of a spinoff's social capital. Several publications provide

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examples of the benefits deriving from relationships developed with suppliers of materials and technologies, and knowledge-intensive business services, and with investors, ex-colleagues, and even former employers (Johannisson, 1988; Brüderl and Preisendörfer, 1998; Agarwal *et al.*, 2004; Elfenbein *et al.*, 2010; Dahl and Sorenson, 2014).

Relationships developed with ex-colleagues at the parent firm are often a crucial part of a spinoff's social capital, and the future entrepreneur often relies on these strong ties when starting the new venture. Firms are social settings where individuals meet, interact, and often become friends, developing a sense of interpersonal trust that may become a key relational asset for a future entrepreneur, who can use these relationships to access or develop new information and insight during the foundation of the spinoff. Spawned entrepreneurs may also hire ex-colleagues or ask them to join the founding team. Several empirical studies have shown that ex-colleagues often become the first employees of the new venture (Dahl and Sorenson, 2014), or founding team members (Ruef, 2010).

Relationships with former employers may be part of a spinoff's social capital too. Many spinoffs maintain close relationships with their parent firms. Chatterji (2009) demonstrates, for instance, that spinoffs benefit from their parents' knowledge and networks as long as the latter's attitude to the spinoff is benevolent (in the words of the authors, these are the spinoffs spawned with a silver spoon). Similarly, a few researchers have highlighted the ability of some parent firms to generate new entrepreneurship by nurturing the ideal conditions for internal and external relationships to develop that may turn into a useful social capital for business creation purposes (Johannisson, 1988; Gompers *et al.*, 2005; Furlan and Grandinetti, 2014).

Not all parent firms are benevolent toward their spinoffs, however; some perceive them as predators stealing their ideas and innovations (Klepper and Sleeper, 2005). Spinoffs may in fact become real or potential competitors and, as mentioned before, they may take important customers away from the parent company. In such cases, the relationship between the parent and the spinoff is likely to end with the latter's spawning. Parent firms may even be hostile toward their spinoffs, adopting strategies to counteract their initiatives, and hampering their performance (Walter *et al.*, 2014). For example, parents may disseminate negative information about a spinoff, convincing third parties to continue to deal with the parent firm and abandon any relations with the spinoff's founders. Walter *et al.* (2014) argue that spinoff founders can limit the negative effect of a parent firm's hostility by developing a network of relationships with new partners that are not directly connected to the parent and are thus less likely to be subject to its influences. In other words, before they found the new business, future entrepreneurs should develop relationships beyond the sphere of the parent firm's social capital.

4. An integrative framework for describing a spinoff's endowments

This section integrates knowledge inheritance theory from the social capital perspective to explain the formation of a spinoff's endowments. Knowledge inheritance theory posits that it is the quality of their intellectual capital at birth that explains why spinoffs outperform other startups. Spinoffs inherit this intellectual capital from their parent firms, which are seen as the depositaries of a hereditable knowledge that an enterprising employee can learn. This knowledge might concern technologies embedded in the parent firm's services or products, market trends and customer needs, or new business opportunities. Regardless of its content, this

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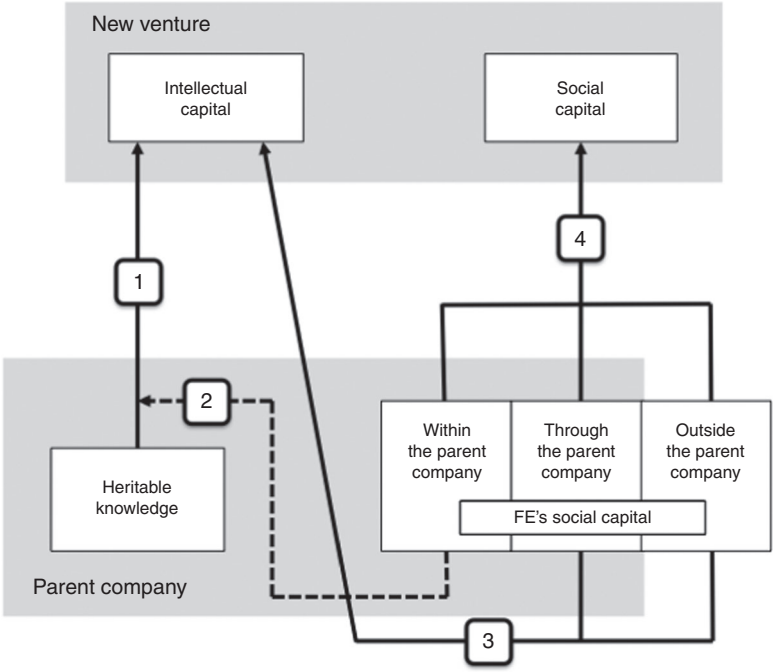
knowledge has two characteristics: it resides within the parent firm, which serves as a knowledge container; and it can be put to good use in the foundation of the spinoff. Though there are differences in the quantity and quality of the knowledge that can be transferred, a spinoff presumably inherits intellectual capital as a result of a learning process on the part of the future entrepreneur (Figure 1).

Reviewing studies in the entrepreneurship literature, it is argued that: a spinoff's intellectual capital can be developed by exploiting the future entrepreneur's social capital before the new venture comes into being; and, on the other hand, that social capital is also a stand-alone endowment that complements the spinoff's intellectual capital at the time of its foundation. Based on the studies considered, it can be identified three types of social capital that the potential entrepreneur founding a spinoff should possess. First, there is the social capital consisting of the relationships that the potential entrepreneur will have developed within the boundaries of the parent firm (e.g. relationships with colleagues, managers, the CEO, or founder). The second type of social capital stems from relationships that the potential entrepreneur develops through the parent firm with external organizations or actors that do business with the parent firm (e.g. relationships with customers, suppliers, banks, institutions). The third type of social capital derives from those relationships that the potential entrepreneur develops outside the parent firm's immediate network, in a variety of other social and business contexts (e.g. relationships with suppliers/customers/competitors not directly connected to the parent firm, or with people met at associations or conferences). The social capital gained within, through, and outside the parent company before starting up the spinoff contributes to the formation of the latter's intellectual capital in two different ways.



Note: FE, future entrepreneur

Figure 1.
An integrative framework of a spinoff's endowments

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First, the future entrepreneur's social capital gained from within the parent firm reinforces the intellectual capital inheritance process. Several papers show that the social capital developed by future entrepreneurs within their parent firms positively affects the former's capacity to absorb knowledge from the latter (Furlan and Grandinetti, 2014; Johannisson, 1988; Gompers *et al.*, 2005; Stuart and Ding, 2006). This might seem in contrast with knowledge inheritance theory, but it actually complements it. Knowledge inheritance theory does not delve into the learning mechanisms because knowledge is assumed to be transferred automatically to the progeny, but this inheritance always derives from some kind of learning process, be it learning by doing, on-the-job training, or interpersonal exchanges. This last learning mechanism relies on the future entrepreneur being exposed to, and interacting with knowledgeable others within the parent company. Most of the "parent-specific" knowledge needed for the new venture is tacit and resides in the people working for the parent company. To absorb this knowledge, future entrepreneurs need to come face-to-face and collaborate with the holders of such knowledge.

Second, the relationships that future entrepreneurs develop through and outside their parent firms contribute to the generation of additional intellectual capital for the spinoff. Unlike the social capital acquired from within, the social capital developed through and outside the parent firm directly nurtures the intellectual capital that founders cannot inherit from their parents. The intellectual capital gained thanks to these latter two types of social capital is not available within the parent company, nor can it come from interacting with people working for the parent company. As outlined in the previous section, future entrepreneurs rely on a variety of relationships developed with actors beyond the boundaries of the parent firm to learn valuable technical and market knowledge, recognize new business opportunities, or refine their original business ideas. To give an example, innovative users and customers can provide useful information on possible product innovations or new market trends that exceeds the knowledge embedded within the parent firm's boundaries. Similarly, employees interacting in social contexts outside the parent firm can discover good business opportunities and acquire new intellectual capital beyond the realms of knowledge inherited from the parent.

The proposed framework also interprets social capital as an endowment of spinoffs at the time of their foundation, i.e. the social capital developed by the founder of a spinoff during the pre-entry period also becomes a stand-alone endowment when the spinoff actually starts operating (Figure 1).

Several studies highlight that spinoff founders exploit relationships they have developed during the pre-entry period within, through and outside the parent company to access resources that become valuable after the spinoff has opened for business. To give an example, relationships with ex-colleagues (social capital gained within the parent firm) can be a source of valuable advices or can help the new entrepreneurs to hire suitable employees. Spinoff founders can start doing business with the parent firm's customers, or receive important input from the parent firm's suppliers; in other words, they leverage on relationships previously developed with the parent firm's business partners (social capital gained through the parent). The legitimacy of former employees of incumbent firms may also stand to gain from having privileged access to their ex-employer's social networks (another example of social capital gained through the parent firm). This aspect depends largely on the parent firm's attitude to spinoffs, however: only benevolent or neutral parents allow ex-employees to access and benefit from their own networks.

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The relationships that future entrepreneurs develop outside the context of their parent company may also provide them with valuable resources when they first start up in business. As an example, such relationships can become crucially important if the parent firm takes a hostile attitude toward the spawns. In such situations, new entrepreneurs have to decouple their networks from the immediate networks of their previous employers to reduce the negative influence that the latter might have on the spinoff's early life (Walter *et al.*, 2014). To develop an independent network, entrepreneurs need to rely on relationships that they have developed outside the parent network during the pre-entry period.

5. The integrative framework in action

A conceptual framework is useful to the extent that it helps to clarify phenomena or provide answers that existing theories are unable to address adequately (Nahapiet and Ghoshal, 1998; Furlan and Grandinetti, 2014). So far as spinoff literature is concerned, two seem to stand out for their importance from a theoretical as well as empirical standpoint. The first is whether spinoffs can differ from their parents in terms of intellectual capital (Agarwal *et al.*, 2004; Furlan and Grandinetti, 2014); the second is why spinoffs tend to co-locate near their parents in geographical clusters (Sorenson, 2003; Boschma, 2015). In the next two subsections, the integrative framework is applied to tackle these two important questions.

5.1 Spinoffs and diversity of intellectual capital

Knowledge inheritance theory posits that employees of incumbent firms are in a position to start their own venture using knowledge inherited from their employers. Firms with an abundance of know-how are more likely to spawn new ventures, both because they are more likely to possess information that is valuable for the purpose of discovering new business opportunities, and because investors are more willing to invest in new ventures spawned by knowledge-rich, prominent firms, rather than by those less well endowed. When employees leave to set up new ventures, they walk away with their parent firms' tacit knowledge of markets and technologies (Agarwal *et al.*, 2004). The spinoff's initial endowment of intellectual capital thus tends to reflect the parent firm's knowledge at the time of the spinoff's foundation. This imprinting may persist for some time because the initial stock of inherited knowledge is likely to have long-term effects on the spinoff's knowledge accumulation paths. Simply put, knowledge inheritance theory assumes that spinoffs will have much the same intellectual capital as the parents from which they originate. In line with this approach, the Klepper and Sleeper (2005) model suggests that spinoffs' products are initially similar to those of their parents. Spinoffs tend to replicate the incubator firm's products, processes, and business model, though often only partially, as in the case of spinoffs resulting from a parent firm's outsourcing strategy (Furlan and Grandinetti, 2014).

In their influential paper, Agarwal *et al.* (2004) argue that firms with a plentiful technological or market pioneering knowledge are more likely to spawn spinoffs because these firms' employees are more likely to absorb cutting-edge know-how, in the form of both organizational blueprints and tacit human capital. This brings up a sort of conundrum: if incumbents with a profound knowledge of only one domain (marketing or technology) spawn more than one spinoff, and if spinoff founders only inherit knowledge from their parents, then at the time of their foundation spinoffs will lack a part of the market pioneering or technological knowledge they need in order to succeed.

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They have to fill this gap, so they need to look elsewhere to access the knowledge they cannot inherit from their parents. Thus, contrary to the assumption of knowledge inheritance theory (Klepper and Sleeper, 2005), successful spinoffs have to differ somewhat from their parents in terms of their intellectual capital. Based on the integrative framework, it is maintained that it is thanks to their social capital that successful spinoff founders are able to top up their knowledge before they start up.

To see how social capital can explain the difference between a spinoff's and a parent's intellectual capital, this study distinguishes spinoffs founded by one or more employees coming from the same parent firm from those founded by employees coming from multiple companies (for the sake of simplicity, it is not considered the "hybrid" case of a new venture being founded by one or more ex-employees together with people with no previous work experience).

In the former case, the diversification of the intellectual capital is unlikely to derive from social capital acquired within the parent firm (which is normally useful for the purpose of learning from the parent). As argued in the previous section, interaction within the boundaries of the parent firm will presumably reinforce the intellectual capital that can be inherited. Additional intellectual capital is more likely to derive from social capital developed through and outside the parent firm. Figure 2 shows the framework applied to this situation (the part of the framework involving the spinoff founder's social capital as an endowment at the time of the new company's foundation is irrelevant here).

The case of an Italian spinoff from one of Italy's most representative industries may be helpful to exemplify this situation (Ferraro and Grandinetti, 2011). The Freeminds company was founded in 2001 as a spinoff from Northwave, a pioneering firm

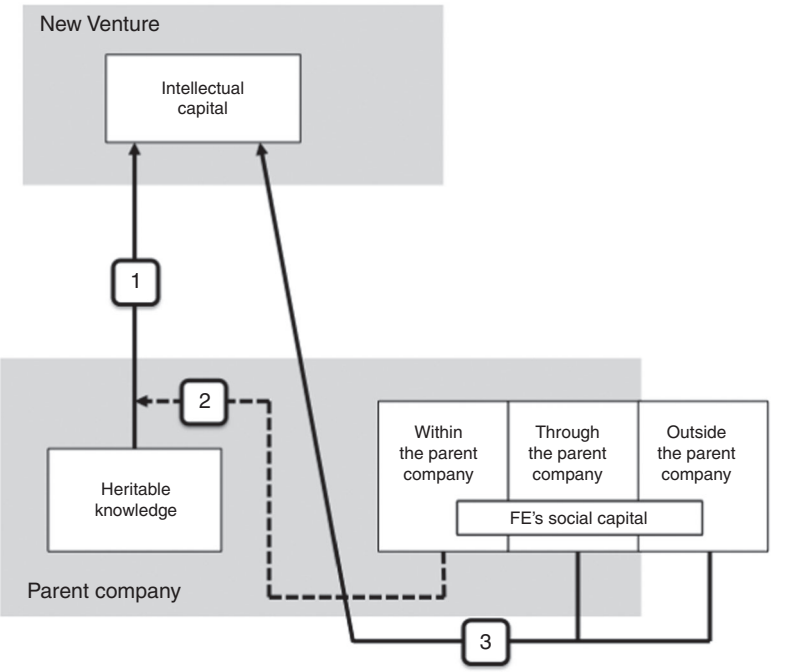

Figure 2.
Spinoffs and their diverse intellectual capital

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operating in the sports footwear industry (North-East of Italy). Freeminds was founded by three Northwave ex-employees who had technical positions in product design. Almost immediately after setting up Freeminds, the founders spotted an opportunity to enter a new market – karting – with new products for protecting the driver's body (gloves, suits, helmets). In entering this new market, they made use of innovative materials that they knew about from their previous work experience; they registered a new trademark, and patented several product innovations. While the intellectual capital they had inherited played a major part in the spinoff's success, its ability to enter a new market and develop new products stemmed from a relationship established outside the parent firm's boundaries before the spinoff had actually been founded. During its incubation, one of the founders met an expert and respected professional in the kart industry at a wedding, who suggested the idea of entering the kart drivers market. The relationship developed and, when the spinoff went into business, the expert helped the founders to identify their customer segments, and also introduced them to people and organizations (kart racers and potential sponsors) in the industry. In short, it was the expertise and connections of a person met in a social context outside the parent firm that enabled the founders to exploit a new opportunity – it had nothing to do with their inherited intellectual capital.

In the second case (spinoffs from multiple parents), the diversity of the spinoff's intellectual capital from that of its various parents can be explained by the relationships between the team of entrepreneurs at the time of its foundation. As in the previous case, these relationships develop during the pre-entry period and are part of the founders' social capital acquired through or outside their parent companies. These founders from different parent firms may or may not be doing business together, but – unlike the previous case – their relationships serve not to absorb knowledge from outside, but to pool the intellectual capital inherited by each founder in the new firm's intellectual capital. The spinoff can thus be endowed with an intellectual capital that is the outcome of a unique combination of the intellectual capital inherited from different parent firms.

There are several famous cases of spinoffs following these dynamics. For example, Apple was born out of a personal relationship between Steve Jobs (who worked for Atari) and Steve Wozniak (employed by HP). After inventing one of the first microcomputers (what would later become the Apple I), the two approached their bosses at Atari and HP, but neither company was interested in microcomputers at that point in time (Audia and Rider, 2005). Jobs and Wozniak consequently founded Apple Computers in 1976 and incorporated the company a year later with the help of Mike Markkula. The case of Apple clearly shows how the dynamics of the integrative framework work. Before founding Apple, the two entrepreneurs had worked in related industries (HP and Atari), where they had absorbed relevant knowledge, acquired self-confidence, and gained access to key social ties. They also had strong social ties (social capital gained from outside their parent firms in the framework) since they had "met approximately five years prior to Apple's first order and even ran a business (the illegal 'blue boxes') together" (Audia and Rider, 2005, p. 17). The close social relationship between Jobs and Wozniak enabled them to pool their experiences and backgrounds, creating a company with a unique endowment of intellectual capital.

5.2 Spinoffs and geographical clustering

One of the most common traits of geographical clusters lies in an intense start-up activity, mostly in the form of spinoffs (Saxenian, 1994; Camuffo and Grandinetti, 2011). Knowledge inheritance theory and the social capital perspective provide different

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explanations as to why spinoffs tend to be established not far from their parents, within clusters (for the sake of brevity, this study refers to this as co-location). Knowledge inheritance theory posits that clusters arise as a consequence of spinoffs tending to co-locate near their parent firms to facilitate knowledge transfer. Klepper (2007) provides an explanation for the formation of the automotive cluster around Detroit between 1900 and 1930 based on disagreements that led employees of the four successful entrants (Olds Motor Works, Cadillac, Ford, and Buick-GM) to found spinoffs in the same industry, and in the same geographical area. Spinoffs in the Detroit area had much higher survival rates than spinoffs elsewhere, whereas the patterns were reversed for inexperienced firms. Similar dynamics are reported for the Akron tire cluster in Ohio (Buenstorf and Klepper, 2009), the semiconductor industry in Silicon Valley (Klepper, 2010; Cheyre *et al.*, 2015), and the software cluster in the Jena region (Buenstorf and Fornahl, 2009).

The social capital perspective suggests that decisions to co-locate spinoffs are the result of the dense relational networks embedded in clusters, where employees can easily develop a variety of interpersonal relationships that eventually lead to the formation of social capital useful for starting new ventures. Of course, all new ventures in clusters, not only the spinoffs, can benefit from these dense social networks (known as external economies), which become a collective feature of clusters generally. Several empirical studies confirm as much. For example, Sorenson (2003) explains the co-location of new ventures within the US biotechnologies and footwear clusters considering social capital as the main driver. The author maintains that, both before and immediately after setting up a new venture, entrepreneurs need to interact face-to-face with numerous people within a cluster to acquire tacit knowledge regarding technologies, markets and business trends. Spatial proximity is therefore important to facilitate these frequent, close interactions. Taking a family tree approach to analyze how the Cambridge high-tech cluster formed in the late 1970s and rapidly expanded during the 1980s, Myint *et al.* (2005) confirm Sorenson's findings that spinoffs tend to cluster in the area where their founders have social networks. Saxenian (1994) also attributes a key role to social capital in explaining the formation and development of Silicon Valley. During the 1970s and 1980s, the rich and intricate networks of interpersonal and business relationships within the cluster spurred a generation of spinoffs (in both the semiconductor and the PC industry) that profoundly changed Silicon Valley. The rich relational content of Silicon Valley remained the fundamental reason for the spinoffs emergence later on too, in the 1990s, as shown by Cohen and Fields (1999).

Consistently with the approach adopted in this paper, it is maintained that the geographical clustering of spinoffs can only be fully understood if one integrates knowledge inheritance theory from the social capital perspective. As Sorenson (2003, p. 525) argues: "combining these two lines of research offers the opportunity to enhance the understanding of the spatial dynamics of industries, as well as their evolution on other dimensions."

For analytical reasons, this study distinguishes between two situations: the co-location of spinoffs in the early stages of a cluster's formation; and the co-location of spinoffs in a fully fledged cluster.

The premise for the formation of any cluster is the presence in a particular geographical area of a seed organization that is particularly endowed with heritable knowledge (Myint *et al.*, 2005; Klepper, 2010; Camuffo and Grandinetti, 2011). To take advantage of the knowledge they have inherited, one or more employees leave the firm and start their own business. These ex-employees tend to set up in business not far

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from the parent firm, forming the first embryo of the cluster. It is maintained that the reason why they do so stems mainly from the new entrepreneurs' need to exploit interpersonal relationships (i.e. social capital) that they have developed within the parent firm. To nurture these relationships and take advantage of the related social capital, the new entrepreneurs need to maintain face-to-face interactions, and this demands geographical proximity. Relationships within the parent firm are the only ones that can explain co-location during the formation of a cluster, since the parent is the only firm (or one of only a handful of firms) operating in that particular area. These relationships acquired from within can be used to start the first business transactions, or to help solve the multitude of problems that new ventures encounter in the start-up phase. To sum up, it is maintained that the reasons for co-locating spinoffs during the early stages of a cluster's formation lie not in the knowledge inheritance process *per se*, but in the new entrepreneurs' need to exploit the social capital that they developed within their parent firms before setting up in business on their own. Figure 3 shows how the framework applies to this situation.

A case in point that exemplifies these dynamics is the luxury footwear district in the North-East of Italy (Camuffo and Grandinetti, 2011). Although a number of artisan shoemakers already operated in the area in the second half of the ninteenth century, an industrial district proper only developed after 1891, with the foundation of the Voltan shoe factory. Luigi Voltan was an entrepreneur who had spent some time in the USA, where he had come into contact with the American shoe industry, which was the most advanced in the world at the time. When he came back to Italy, he founded his

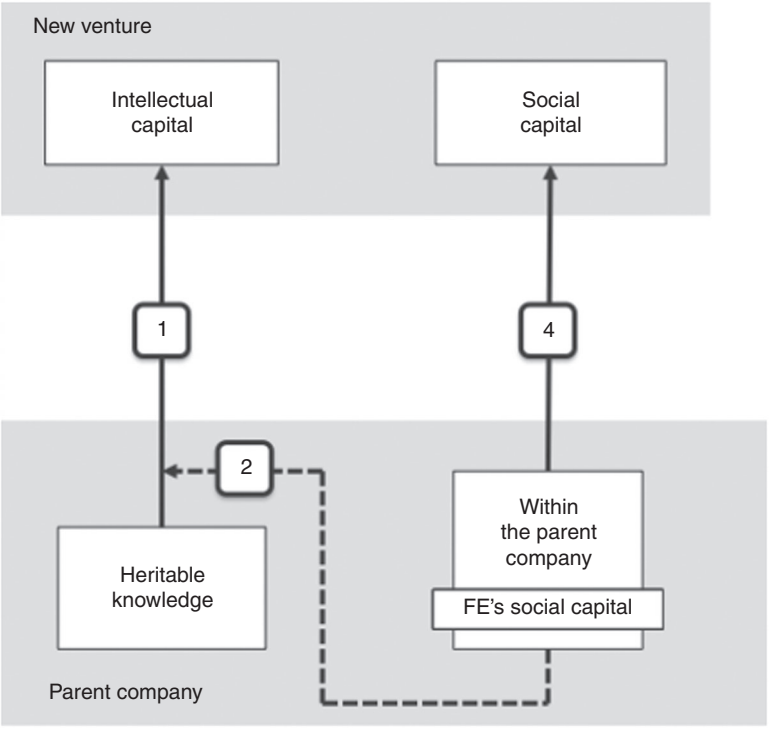

Figure 3.
Spinoffs and cluster formation

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own firm, taking advantage of the technical and commercial knowledge acquired abroad and putting the skills available locally to good use. The firm's success led numerous employees to leave the firm during the 1920s and 1930s to set up a business of their own within the area, often working as subcontractors to the parent firm. It emerged from interviews with the original founders that all these new entrepreneurs counted on the experience and knowledge they had absorbed during the years they had spent working for Voltan. The fundamental reason why they stayed within the cluster was so that they could exploit their relationships with their former employer and ex-colleagues, i.e. the social capital they had developed within the parent firm.

The reason for co-locating a spinoff changes, however, after a cluster has become well established. A mature cluster provides a setting in which an inextricable network of inter-organizational and interpersonal relationships between firms and people has been nurtured and can be exploited to support new business ventures. In other words, the whole cluster works as an incubator or a meta-incubator for spinoffs (Grandinetti, 2014). In such a setting, future entrepreneurs are likely to have developed numerous local relationships through or outside their employers' firms, and such relationships are likely to have outgrown (in number and importance) those developed within the parent firm (Figure 4). In a fully fledged cluster, co-locations are motivated mainly by the opportunity they give a spinoff's founders to take advantage of their social capital gained through and outside the parent firm. This social capital facilitates tacit knowledge transfer more effectively if the parties involved are geographically close enough to allow for frequent personal interactions. Simply put, clusters are settings that generate new entrepreneurs who are "networking people," and that is why they

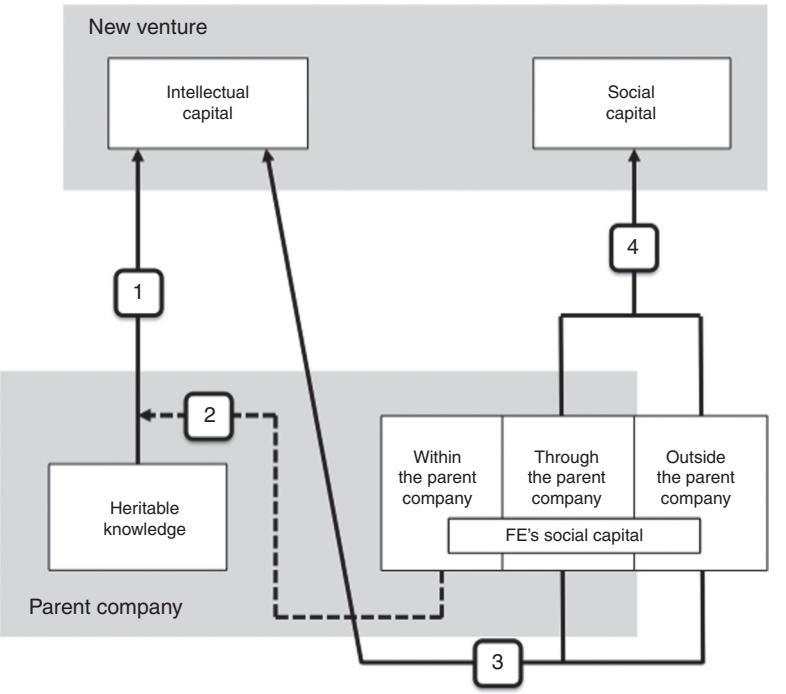

Figure 4.
Cluster as an incubator for spinoffs

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do not stray from the cluster (Johannisson, 1988). As clearly emerges from some studies (Hervas Oliver and Dalmau Porta, 2006; Camuffo and Grandinetti, 2011), clusters help future entrepreneurs to learn from the local relationships in which they are embedded.

6. Conclusions

Steven Klepper's knowledge inheritance theory provides a robust explanation for the advantage that spinoffs – i.e. new ventures founded by ex-employees of incumbents – enjoy over other types of new ventures. On the other hand, despite its wide application and empirical validation, this theory downplays the role of social capital in explaining the spinoffs' comparative advantage.

This paper integrates knowledge inheritance theory from the social capital perspective, proposing a framework in which social capital is both a mechanism that supports the generation of intellectual capital before a spinoff is founded and an endowment that complements the intellectual capital that a spinoff founder possesses at time of the new venture's foundation. To construct this framework, the literature on knowledge inheritance theory is associated with contributions in the entrepreneurship literature focussing on the social capital of new ventures. There has been a curious lack of dialogue between scholars focussing on these two lines of research and this paper makes an effort to fill this gap.

In this integrative framework, knowledge inheritance remains a fundamental mechanism for the formation of a spinoff's intellectual capital. Its other endowment, social capital, derives from three types of relationship that future entrepreneurs develop within, through, and outside their parent firm, all three of which are crucial to the formation of a spinoff's intellectual capital. The first type of social capital favors the absorption of the parent firm's heritable knowledge, while the second and third enable further knowledge to be absorbed from elsewhere.

This study applies the integrative framework to shed light on two questions that have yet to find satisfactory answers. One concerns whether spinoffs can differ from their parents in terms of intellectual capital. According to knowledge inheritance theory, spinoffs have much the same intellectual capital as their parent firms, and consequently offer similar products and compete in similar or adjacent markets. But this view neglects those spinoffs endowed with a substantially different intellectual capital from that of their parents already at the time of their foundation. Using the integrative framework, it is argued that future entrepreneurs can develop their social capital through and outside, as well as within their parent firm, thereby accessing information and absorbing knowledge from elsewhere, and acquiring additional intellectual capital that does not derive from the inheritance process. An alternative is the formation of founding teams that amalgamate knowledge inherited from different parents, giving birth to spinoffs endowed with unique combinations of intellectual capital.

The second question concerned why spinoffs tend to co-locate near their parents in geographical clusters. Knowledge inheritance scholars basically argue that spinoffs tend inertially to be set up near their parents to take advantage of knowledge transfer. But Klepper (2009) rightly said that much remains to be learned about the geographical agglomeration of spinoffs, and that plausible explanations would probably go beyond the realms of knowledge inheritance theory alone. Applying the integrative framework, it is maintained that, in the early days of a cluster's formation, spinoffs co-locate near the parent firms to exploit the social capital that their founders will have developed in their previous employment. Daily, face-to-face interactions with ex-colleagues or ex-employers are needed to obtain information and knowledge essential to the new venture's success. Once a cluster has become mature, new spinoffs continue to co-locate

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within the area to take advantage of the social capital that their founders will have developed through and outside their parent firms, with other operators – most of which are likely to be located within the cluster's boundaries.

The analysis developed in this study has interesting implications for local and regional development policies. As a broad literature has emphasized (e.g. Asheim *et al.*, 2006), spinoffs and geographical clustering represent key facets of these policies. However, actual policies have neglected two aspects of paramount relevance. First, if parents are conservative and hostile toward their spinoffs, the likelihood that spinoffs locate close to them substantially decreases thus hampering the formation and reproduction of the clusters (Figures 3 and 4). Policy makers should therefore incentivize the generation of new spinoffs while discouraging, at the same time, hostile behaviors of parents toward genuine entrepreneurial efforts of their employees. Second, when a cluster has reached a maturity stage, cognitive lock-in effects may limit innovation processes thus causing the decline of the cluster (Molina-Morales and Martínez-Fernández, 2009; Grandinetti, 2014). In such situations, policy makers should encourage the emergence of spinoffs that combine the knowledge absorbed or inherited from different actors (individuals or firms). Only the combination of distant bodies of knowledge can sustain innovation processes that can break lock-in effects that many clusters are experiencing (Figures 2 and 4).

A limitation of the framework developed in this study is related to the fact that it considers only the individual level thus neglecting the organizational level. In the framework both the intellectual and the social capital are endowments of the founders. Future research might integrate the organizational level thus distinguishing the endowments brought by the founders from the resulting resources of the spinoffs that they found.

The framework is also in need of empirical validation. Future studies might use the framework to develop and test hypotheses about the similarities/differences between the intellectual capital of spinoffs and the intellectual capital of their parents. Future empirical research can also use the framework to analyze and track the dynamics of co-location of spinoffs in geographical clusters.

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