



## EDITORIAL

# Absorptive capacity and knowledge management in small and medium enterprises

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## Abstract

Studies on knowledge management have generated an awareness that it is fundamentally important for small- and medium-sized enterprises (SMEs) to be able to exploit sources of knowledge outside the firm by means of external relationships, but this understanding has not been followed up by an adequate theoretical and empirical research effort to analyse the role of relationships in an SME's knowledge management processes. The present contribution first sketches this gap on the grounds of the available literature reviews. Then it proposes a framework – focusing the concept of absorptive capacity – with a view to filling this theoretical gap. Finally, based on the proposed framework, two specific topics of considerable importance to SMEs are discussed: (i) how capabilities are developed in the start-up phase of a new venture; and (ii) knowledge processes in geographical clusters.

*Knowledge Management Research & Practice* (2016) 14(2), 159–168.

doi:10.1057/kmrp.2016.2

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**Keywords:** SMEs; absorptive capacity; relationships; tacit knowledge; knowledge codification; new ventures; geographical clusters; inter-firm cooperation

## Introduction

Various lines of research in the field of management and strategy studies have led us to acknowledge that the most important aspect distinguishing small- and medium-sized enterprises (SMEs) from large firms is their propensity to overcome the constraints deriving from their limited size by exploiting relationships developed outside the firm. This has been thoroughly clarified by taking the resource-based view, according to which external resources are those physical or other assets over which the firm has no direct ownership, but that it can access through its relationships with other firms and organizations (Das & Teng, 2000).

Along this line of enquiry, numerous studies have been conducted on new ventures, examining the role of interpersonal and inter-organizational relationships in the phase of a new firm's incubation, in the subsequent phase of resource assembly, and then in the delicate start-up phase when the newly established enterprise has to cope with the typical liability of newness (and smallness). That is why Johannisson (1988), in one of the first contributions to this field of study, defined the entrepreneur as a 'networking man'. More recently, some authors have suggested that inter-organizational relationships should be seen both as a specific growth modality used by firms (and SMEs in particular), and as a lever for supporting their growth (McKelvie & Wiklund, 2010; Furlan *et al*, 2014). An abundance of literature on clusters has also demonstrated that the external economies of which firms within clusters (which are usually small businesses) are able to benefit

are closely linked to the relationships existing between the firms operating within the cluster (Porter, 1998).

Studies on knowledge management have likewise made us realize that it is fundamentally important for SMEs to be able to exploit external sources of knowledge (e.g., Desouza & Awazu, 2006), but this awareness has yet to be followed up with an adequate theoretical and empirical research effort to analyse the role of relationships in an SME's knowledge management processes. As recent literature reviews on knowledge management in SMEs (e.g., Durst & Edvardsson, 2012) have demonstrated, researchers have paid more attention to analysing these processes from the intra-organisational perspective. This shortcoming has motivated the present contribution and other papers contained in the special issue that *Knowledge Management Research & Practice* dedicates to 'Knowledge management and relationships in SMEs'.

On the basis of the available literature reviews, this introductory analysis first identifies the shortage of ample, thorough research into the relational domain of knowledge management in SMEs. Then a framework that focuses on the concept of absorptive capacity is proposed with a view to filling this theoretical gap. This framework is then used as a basis for analysing two specific topics of considerable importance to SMEs: one concerns how capabilities are developed in the start-up phase of a new venture; the other focuses on knowledge processes in geographical clusters.

### Studies on knowledge management in SMEs

The association between relationships or networks and SMEs is a topic that recurs fairly frequently in the knowledge management literature, both in theoretical contributions and as evidence of empirical studies. It has been amply acknowledged that it is hugely important for SMEs to have access to knowledge produced by others, which often demands an interaction between the parties (Egbu *et al*, 2005; Thorpe *et al*, 2005; Chen *et al*, 2006; Desouza & Awazu, 2006; Durst & Edvardsson, 2012). But our understanding on the matter of knowledge management and relationships in SMEs is not enough to give us a whole, detailed picture of this connection, and to clearly bring out the differences between SMEs and larger-scale enterprises. This is the impression that we get from the literature reviews conducted on knowledge management in SMEs.

Thorpe *et al* (2005) provide a systematic review of the literature on how SMEs use knowledge, selecting 69 articles published up until 2004. Some of these articles correlate the use of knowledge with its acquisition by means of relationships with parties outside the enterprise. Among them, the contributions from Yli-Renko *et al* (2001) and Liao *et al* (2003) are particularly interesting for the purposes of our present analysis. Studying the relationship with the main customer in a sample of young technology-based firms, Yli-Renko *et al* (2001) find that social capital (Nahapiet & Ghoshal, 1998) facilitates external knowledge acquisition, and that such knowledge is, in

turn, associated positively with knowledge exploitation to gain a competitive advantage, through the development of new products, for instance. To be more precise, the items of social capital that have an impact on knowledge acquisition include: maintaining close social relationships with a key customer; personally knowing this customer's people; acquiring new customer contacts and business relationships through this key customer. Analysing a sample of growth-oriented SMEs, Liao *et al* (2003) find that the organizational responsiveness of these firms (reflecting the speed and coordination with which their actions are implemented and periodically reviewed) can be expected to increase if they have a well-developed absorptive capacity. Going along with Cohen & Levinthal (1990), the authors posit that absorptive capacity consists of two major components: external knowledge acquisition and internal (intrafirm) knowledge dissemination.

The review conducted by Durst & Edvardsson (2012) on knowledge management in SMEs concerns 36 empirical research papers published between 2001 and 2011. Three interesting issues emerge from this analysis. For a start, some knowledge management processes have been little explored to date, including knowledge identification, knowledge storage/retention, and knowledge utilization. One topic that has been considered more frequently is knowledge transfer (treated in 7 of the 36 works under review), though the reviewers say that, 'more research is needed, addressing both sides of the process: the sender and the receiver. So far, the discussion is rather one-sided' (p. 897). In other words, these works have paid too little attention to the link between partner interactions and knowledge transfer. Finally, the articles reviewed fail to deal with the forms of interdependence between the cognitive processes involved, with the exception of Cegarra-Navarro & Martínez-Conesa (2007), who examine how knowledge management has an impact on the adoption of e-business, particularly in SMEs. In this particular study, the authors emphasize that processes of relational knowledge acquisition (through suppliers or customers), knowledge sharing (the transmission of knowledge from employees who deal with customers and suppliers to the rest of their organization), and knowledge application need to be addressed holistically rather than separately.

The review conducted by Cerchione *et al* in this special issue outlines the state of the art on knowledge management in SMEs from an outlook complementary to the works of Thorpe *et al* (2005), and Durst & Edvardsson (2012), focusing on:

1. factors and barriers affecting the spread of knowledge management practices in SMEs;
2. the impact of knowledge management on SMEs' performance; and
3. knowledge management systems in SMEs.

The authors divide the papers they review into two groups, depending on whether they concern single SMEs or networks of such enterprises. Of the 94 works selected (written between 2000 and 2014), only 7 focus on SME

networks. Among these last papers, there is only one contribution that discusses the first of the above three areas: Chang *et al* (2012) conduct a desk analysis of the cooperative strategies that a focal firm may adopt in different supply-chain networks, highlighting the role of knowledge sharing routines as a strategy determinant. The reviewers conclude that a more thorough investigation is needed on the factors and barriers affecting knowledge management practices. The relationship between knowledge management and an SME network's performance is only discussed in two articles, while there are four publications concerning the third area of interest (knowledge management systems). For both these areas, the reviewers come to the same conclusion that further studies are warranted.

Surprisingly, the above reviews never mention any contributions dealing, from a knowledge management perspective, with the topic of knowledge co-creation, even though it clearly emerges – often going by the name of co-design or co-innovation – in several studies on supply-chain networks or other types of network (e.g., Möller & Svahn, 2006), and even more in the literature on knowledge-intensive business services (den Hertog, 2000; Bettencourt *et al*, 2002; Muller & Doloreux, 2009). In both settings, the presence of SMEs has been well-documented. In the case of knowledge-intensive business services, customization and knowledge co-creation are two sides of the same coin: These service providers offer highly customized services, each of which is based on a process of collaborative knowledge creation by the supplier and customer together (Bettiol *et al*, 2012).

### **Absorptive capacity, relationships and knowledge codification in SMEs**

The core element on which we construct our framework is the concept of absorptive capacity, a construct amply used in studies on management in general, and in those on supply-chain management in particular (e.g., Revilla *et al*, 2013; Choi, 2014), but still little used in the knowledge management literature. According to Cohen & Levinthal (1990), who introduced the concept, outside sources of knowledge are often crucial to the innovation process, so the ability to exploit external knowledge is crucial to an enterprise's capacity for innovation. To be more specific, a firm's absorptive capacity lies in its 'ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends' (p. 128). Its constitutive elementary processes are therefore the monitoring (which necessarily precedes any evaluation) and the evaluation of new knowledge, its assimilation, and the subsequent use of this newly assimilated knowledge. It seems fairly obvious that these two pairs of processes echo the classic dichotomy proposed by March (1991) between exploration and exploitation in organizational learning. There have been formidable developments in IT since 1990, which have a huge impact as an enabler of absorptive capacity (Roberts *et al*, 2012), and this is certainly one of

the reasons why the interest of researchers has focused on this particular concept.

Cohen & Levinthal provide an extensive definition of knowledge absorption, which includes the exploitation of knowledge. It is important to make the point here that externally sourced knowledge does not necessarily pass through all the steps mentioned in the definition, as it may be assimilated correctly and therefore be available for use, but remain unused for a variety of reasons (Davenport & Prusak, 1998). For example, its exploitation might be too costly, or there may be differences of opinion and internal conflicts on whether the knowledge assimilated should be used or not. In their reconceptualization of absorptive capacity, Zahra & George (2002) underscore that the move from assimilation to use cannot be taken for granted. So we have a multidimensional construct that includes four interdependent capabilities, each of which presides over a specific process: acquisition and assimilation combine to constitute a potential absorptive capacity; and transformation and exploitation together form the realized absorptive capacity. The novel process that is added to those already identified by Cohen & Levinthal is therefore a matter of knowledge transformation, which consists in the capacity to develop new knowledge by combining the new knowledge absorbed with the knowledge already available within the recipient organization. The model proposed by Zahra & George is sequential, but Todorova & Durisin (2007, p. 775) criticize this approach, arguing that 'knowledge transformation is not the step after knowledge assimilation but represents an alternative process linked to assimilation by multiple paths'. In fact, external knowledge sometimes cannot be assimilated (i.e., understood) because the receiving organization lacks the cognitive structures to do so. Todorova & Durisin also differ from Zahra & George in that they propose to reintroduce 'recognizing value' as a process of absorptive capacity, as in the Cohen & Levinthal model.

According to Cohen & Levinthal, and the other above-mentioned contributors, absorptive capacity largely depends on the level of prior related knowledge, a concept that measures the distance between the external knowledge to be absorbed and the knowledge that the organisation receiving it has developed over time. Cohen & Levinthal see this prior related knowledge as being intimately linked with an enterprise's R&D investments and facilities. This (objectively excessive) link stems from the two authors' research interests concerning the complex nature of R&D activities. The concept of absorptive capacity had already emerged in an earlier work in which they argue that, 'while R&D obviously generates innovations, it also develops the firm's ability to identify, assimilate, and exploit knowledge from the environment – what we call a firm's "learning" or "absorptive" capacity' (Cohen & Levinthal, 1989, p. 569).

For our purposes, we need a more restrictive definition of absorptive capacity, that does not extend to exploitation, so that we can prevent the concept from coinciding with the whole domain of knowledge management. We might

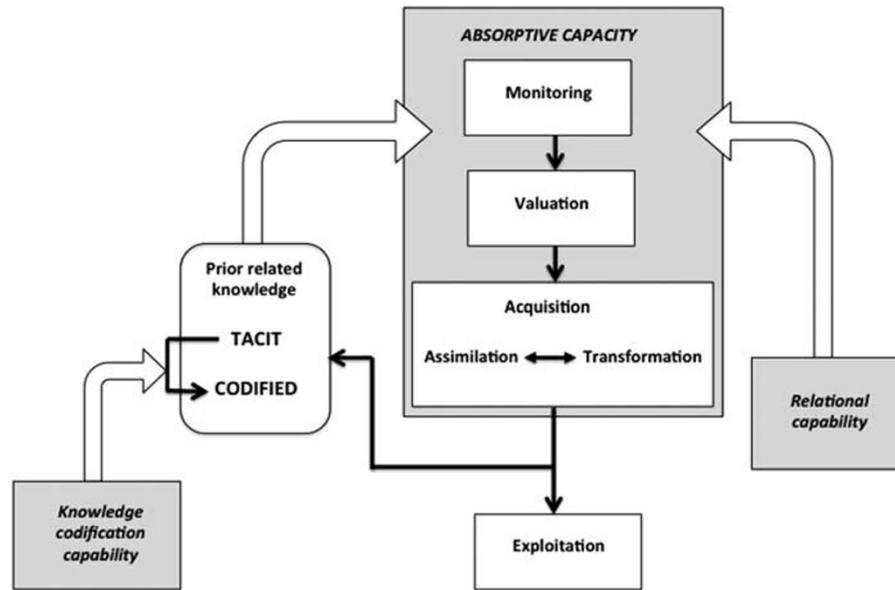


Figure 1 A model of absorptive capacity.

add that the extended view of absorptive capacity may justify a certain diffidence demonstrated by knowledge management scholars in dealing with this concept. We therefore define absorptive capacity as a combination of external knowledge monitoring, evaluation, and acquisition. These are the first three processes identified by Cohen & Levinthal, only that we replace the term 'assimilation' with the less ambiguous 'acquisition'. Leaving aside the scarcely appropriate use made of this term by Zahra & George, we go along with Cohen & Levinthal, who refer in their seminal contribution to knowledge acquisition as 'the ability to put new knowledge into memory' (p. 129). Knowledge is committed to memory by means of a process of both assimilation (in its strict sense) and transformation, as foreseen by Todorova & Durisin (2007), or – better still – by means of an assimilation or accommodation through transformation, to borrow the terminology used in his studies on learning by Jean Piaget (1961), the most influential developmental psychologist in Western history.

Again for the purposes of our analysis, the theoretical approach formulated by Cohen & Levinthal needs to be broadened, when we wish to consider the determinants of absorptive capacity, that is, the enterprise's prior related knowledge and its relational capability. The nature of the former can be usefully framed by resorting to the most classic 'lens' used to analyze knowledge, which is the dichotomy between tacit and codified (Moustaghfir & Schiuma, 2013). To be more specific, we see prior related knowledge as containing both tacit and codified knowledge, bearing in mind that: a fair amount of the knowledge qualified as tacit can be made explicit (Spender, 1996; Gourlay, 2006; Grandinetti, 2014a), and the persistence of tacit knowledge is a *sine qua non* even in organizations strongly dedicated to knowledge codification (Janicot & Mignon, 2012; Muñoz *et al.*, 2015). Prior related

knowledge influences absorptive capacity, and is nourished in turn by absorbed knowledge. It is in the switch from tacit to codified – what Nonaka & Takeuchi (1995) call 'externalization' – that the enterprise's knowledge codification capability comes into play (Furlan *et al.*, 2007; Bettiol *et al.*, 2011). On the other hand, the firm's relational capability is what enables it to access external resources effectively, including knowledge (Schiuma & Lerro, 2008); in general terms, it represents the ability to develop and manage a network of relationships successfully (Lorenzoni & Lipparini, 1999; Furlan & Grandinetti, 2011).

This reconceptualization of the absorptive capacity construct (Figure 1) helps us to put two distinct and opposite absorption processes, that we describe as codification-driven and interaction-driven absorption, into the right context. The first is typically represented by a large enterprise's R&D department engaging in a number of innovation projects. While it is developing these projects, it conducts a broad-based review of scientific articles, research reports, patent documents, and other forms of codified knowledge that may be pertinent to its projects. The codified knowledge already available at the R&D department supports this monitoring and evaluation effort. In addition, if single R&D employees internalize the external knowledge with which they come into contact, that is, they convert it into tacit knowledge (Nonaka & Takeuchi, 1995), they then proceed to analyze, discuss, and store it in their organizational unit's memory. So this absorption process is ultimately dominated by codification. At the other extreme, the second process is permeated by tacitness and (interpersonal) interaction. To give an example, we can consider the supply relationship between two small enterprises, and specifically the situation where the buyer asks the supplier to improve the quality of a component that the former purchases from the

latter – a process that necessitates a transfer of knowledge from the former to the latter. This knowledge is often tacit at its source, and absorbed by the recipient in this same tacit state, although the people involved can facilitate its transfer by means of some form of temporary externalization. For the transfer to be successful, the quality of the interaction taking place between the parties is fundamentally important, lending this construct a meaning that is not as broad as is generally believed in the marketing literature (Woo & Ennew, 2004); it is more specific, in the sense of the quality of the interactive communication. Referring to Figure 1, interaction quality is an expression of an enterprise's relational capability, and depends largely on what Nahapiet & Ghoshal (1998) define as the relational dimension of social capital in describing the kind of personal relationships that people involved in business transactions develop with one another, such as respect, trust, and trustworthiness. It is worth adding here that, for both the processes described, the influence exerted by prior related knowledge on absorptive capacity still holds, as predicted in the original model developed by Cohen & Levinthal (1990).

A third way differing from the two above-described processes can be seen when the relationships serve as a vehicle for absorbing codified knowledge. This is what happens, for instance, when it is more localized than scientific knowledge, such as company rules or operating guidelines (Spender, 1994), in which case the tacit dimension remains important because codified knowledge needs to be interpreted with the aid of tacit knowledge (Howells, 2002). Tacit knowledge and face-to-face interactions help to dissipate the ambiguity of codified knowledge (Grandinetti & Tabacco, 2015).

The three knowledge absorption processes coexist and are interwoven in every enterprise, but there is no denying that the first (together with the third) prevail in large enterprises while the second is more prevalent in smaller firms. It is important to mention here that what distinguishes SMEs is not their intensive recourse to outside knowledge sources (as is often claimed) – large enterprises are ahead of SMEs from this point of view, thanks to the more powerful and extensive monitoring capacity at their disposal. The difference lies instead in the fact that SMEs – and the small even more than medium enterprises (Coltorti *et al*, 2013) – access external knowledge sources mainly through a mechanism of knowledge absorption based on tacitness and interpersonal interaction.

The interaction-driven absorption process can generate formidable results, as well as facilitating the production of new knowledge 'within' the relationship (co-creation). Having said that, we should not overlook the two main drawbacks that penalize an enterprise whose knowledge acquisition from the surrounding competitive environment occurs more or less exclusively through this mechanism, as is typically the case of many small firms. The first drawback concerns cognitive lock-in, which works in much the same way as when consumers always satisfy certain needs by purchasing products under the same

brand name, never exploring alternative options (Murray & Häubl, 2007). Our enterprise can avoid lock-in by expanding its information and knowledge sources (Laursen & Salter, 2006), but this demands a specific commitment to knowledge codification. The second drawback comes to light when we look at the knowledge absorption process as a whole. If absorbed knowledge remains in the tacit state, and is only deposited in the memory of individuals who gain possession of it, who fail to socialize it with others (in a passage from tacit to tacit, according to Nonaka & Takeuchi, 1995), then the enterprise loses this knowledge if these individuals leave the company to work elsewhere, or simply to retire (Lawson & Lorenz, 1999; Desouza & Awazu, 2006; Joe *et al*, 2013). Of course, the best way to avoid such a risk is to at least partially codify such knowledge. A similar line of reasoning applies to the processes of succession in small family businesses, which have to cope with the problem of transferring the founders' accumulated tacit knowledge to their successors, as emerges from the study by Letonja & Duh in this special issue.

An SME's knowledge codification capability is ultimately what drives it to expand its exploratory capacity and avoid losing precious knowledge, without having to give up the benefits of a good interaction-driven absorption in the process. SMEs naturally cannot afford to invest in knowledge assets like larger companies (Ward, 2004), and this difference is the aspect that warrants attention in future research in the field of knowledge management. It is important to remember that, although embarking on the path of knowledge codification is not easy for SMEs (Wee & Chua, 2013), it can be done successfully, both individually and collectively.

On an individual level, the feasibility of meeting the knowledge codification challenge emerges particularly from studies on the evolution of small supplier enterprises (Bocconcelli *et al*, 2015), young technology-based firms (Yli-Renko *et al*, 2001; Noblet *et al*, 2011), and born-global firms (Fletcher & Prashantham, 2011). In this last case, the authors carefully analysed the knowledge assimilation (or acquisition) processes in rapidly internationalizing SMEs. They showed that these firms adopted high levels of formality in acquiring knowledge, especially as concerns two aspects: the planning of events for sharing explicit and tacit knowledge; and the codifying of tacit knowledge to make it explicit. A quantitative analysis on a sample of SMEs in the Valencia region and a case study on a small firm providing knowledge-intensive business services, conducted respectively by Fidel *et al*, and by Bolisani *et al* in this special issue, provide good examples going in the same direction. All these works, for which the unit of analysis is the firm, demonstrate the importance of inter-organizational relationships in knowledge management processes (codification included), and these relationships are sometimes indirect, as in the approach developed by the IMP (Industrial Marketing and Purchasing) Group (Håkansson *et al*, 2009).

In speaking about a collective level, we are not referring to the albeit important fact that every firm is embedded in a network of its own (or ego network), which is the set

comprising a given focal firm, the nodes that it has ties with, and all the ties between these nodes, including those with the focal firm (Borgatti & Foster, 2003). We are looking instead at forms of cooperation involving a limited number of enterprises (never more than two), entail some type of equity sharing, and lead to the creation of a collective organizational structure. These may be joint ventures, consortia or other formats such as 'business network contracts' (with reference to the Italian experience; Massari *et al*, 2015). Such forms of cooperation can develop in various directions, vertically, horizontally, laterally, or in combinations thereof. What seems most interesting for the purposes of our analysis is the knowledge processes that the collective organizational unit can activate for use by the firms taking part: It can fine adjust procedures and systems for sharing knowledge with enterprises, and enabling the latter to share it between themselves; and it can develop its own absorptive capacity in relation to sources that are important to the enterprises in the network – a task that proves all the more complex, the greater the heterogeneity of the impersonal sources to access or the subjects to involve in the interaction (Bettioli *et al*, 2013). To work effectively on both fronts, and thus act as a knowledge gatekeeper, we know that the organization in question must have an adequate knowledge codification capability. This opens up a promising research avenue for knowledge management studies and it is the direction taken in this special issue by di Agostini and by Esposito & Evangelista. Comparing four network cases, the first of these studies looks at how SMEs learn to develop and manage formally structured networks in order to access new market opportunities that they would be unable to reach on their own. The second study analyses a consortium of 25 high-tech SMEs operating mainly in the aerospace and ICT sectors. Here again, the main goal of inter-firm cooperation was to integrate the resources and capabilities of the participating firms in order to seize additional market opportunities.

### **Knowledge absorption in the start-up phase of a new venture**

The vast majority of businesses are small when they are first established. That is why they suffer from the liabilities of smallness (Brüderl & Schüssler, 1990) and newness, which Stinchcombe (1965) attributed to various factors, including the fact that new organizations involve new roles and routines, which have to be learned and developed. These liabilities are perceived in the new venture's competitive milieu, posing a problem of legitimacy that makes it more difficult for the firm to obtain debt capital, for instance. The period immediately after birth is consequently characterized by a high mortality rate.

Having said that, if we take a look at a cohort of new enterprises belonging to the same sector and located in the same territory, some survive and some collapse. Three of the possible explanations for a new venture's success or failure have been particularly explored in the literature.

A first aspect that has been emphasized concerns asymmetries in the distribution of functional capabilities, which is more plentiful in some new ventures than in others. Academic spinoffs, for instance, are typically born already rich in scientific and technological knowledge and skills, but are short of the marketing skills needed to convert a good idea into a product or service that will be appreciated by the market (van Geenhuizen & Soetanto, 2009).

Second, several studies have made the point that enterprises with a strong innovative content are likely to be more vulnerable because the market's reaction to the innovation is uncertain. This uncertainty compounds the liability relating to the time it takes to learn roles and develop routines, giving rise to a relative disadvantage that is all the stronger, the more the new enterprise is innovative (Elfring & Hulsing, 2003).

Third, studies on spinoffs (i.e., new ventures founded by one or more ex-employees of other firms in the same sector) have underscored the role of inherited knowledge in containing the effects of the liability of newness. These emerging entrepreneurs use the parent firms as incubators, where they learn a great deal and this will shorten their period of exposure to the liability of newness after the birth of their new enterprises (Klepper, 2001). Other *de novo* ventures unable to exploit an inheritance like the spinoffs are consequently at a disadvantage (Helfat & Lieberman, 2002). On the other hand, a spinoff is unlikely to be an exact replica of its parent company (Furlan & Grandinetti, 2014), and innovative spinoffs face some of the vulnerability mentioned in the second of these three factors discussed in the literature.

In the end, there are plenty of examples of newborn firms that suffer from some sort of gap in their knowledge and capabilities. They can try to bridge this gap by recruiting skilled human resources, integrating the entrepreneurial team or the employee base. But this carries a cost that new ventures cannot always afford, and it also entails a period of time for the incoming human resources to adapt to their new roles. But time is of the essence for a firm dealing with the liability of newness. Another way to deal with the problem is to exploit the social capital at the newborn firm's disposal, which often coincides with that of the founding entrepreneur (be it an individual or a team). Hugely important relationships can be developed by entrepreneurs before entering the market, during their previous work experience (inside or outside the parent company), within the university environment in the case of academic spinoffs, or with family, friends, and acquaintances who have expertise that the entrepreneur lacks. An abundant body of literature on entrepreneurship has demonstrated that an important key to entrepreneurial success lies in the ability to develop and maintain a network of interpersonal and inter-organizational relationships: As mentioned in the introduction to this article, Johannisson (1988) effectively put all this in a nutshell by qualifying the entrepreneur as a 'networking man'. What is still lacking, however, is a focus on the precise part

played by such relationships in reducing the newborn venture's knowledge gap during its start-up phase.

Our theoretical outline of absorptive capacity can help to shed light on this problem. In a situation of the kind considered here, the interaction-driven process has a crucial role in absorbing knowledge from outside and developing capabilities inside the company, and thereby improving the company's chances of survival. From this standpoint, the interaction on which the effective acquisition of knowledge depends is bound to be of better quality, if the entrepreneur interacts with people with whom he was already familiar and on good terms. While incubating their business ideas, future entrepreneurs need to pay attention to building up their social capital because it will be useful in their new firm's delicate start-up phase. The future entrepreneurs thus engage in a preliminary monitoring and evaluation of external knowledge sources, although their action is necessarily imperfect because of the limited prior related knowledge at their disposal.

In empirical terms, the contribution from Bettiol *et al* in this special issue discusses how new ventures fill their knowledge gaps and develop the functional capabilities they need to compete, also looking at the role of networks in these dynamics. In the mid-high technological industries forming the object of their investigation, the authors find that a remarkable number of new ventures have shortcomings in a certain category of capabilities, and especially in marketing, management, and ICT. The firms that succeed in bridging their original knowledge gap do so by absorbing knowledge from outside parties. It is also interesting that the founding team's heterogeneity matters – a finding that might be explained by the availability of a broader and more variegated social capital.

### **SMEs in geographical clusters: the pros and cons of cognitive proximity**

Adopting Porter's (1998) classical definition, clusters are 'geographical concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. They include, for example, suppliers of specialized inputs such as components, machinery, and services, and providers of specialized infrastructure. Clusters also often extend downstream to channels and customers and laterally to manufacturers of complementary products and to companies in industries related to skills, technologies, or common inputs. Finally, many clusters include governmental and other institutions – such as universities, standard-setting agencies, think tanks, vocational training providers, and trade associations – that provide specialized training, education, information, research, and technical support' (p. 78). Though long, Porter's definition is very generic, tending to cover a broad variety of situations seen in real life. Let us consider, for instance, the difference between 'hierarchical' clusters and the so-called Marshallian industrial districts: in the former, one large enterprise dominates the

whole cluster, feeding a system of captive local subcontractors (Markusen, 1996); in the latter (which is distinctly more interesting for the purposes of our analysis), many SMEs operating in terminal and intermediate positions along the cluster value chain compete with one another horizontally and cooperate with one another vertically (Maskell, 2001).

SMEs co-localized in clusters of the second type (simply called clusters from now on) benefit from external economies or agglomeration economies. Various studies, starting with the seminal contribution from Maskell (2001), have provided a cognitive interpretation of the competitive advantage of clusters. What distinguishes them relates mainly to the fluidity of the knowledge transfer process – even for tacit knowledge, which is relatively sticky (Venkitachalam & Busch, 2012). In clusters, knowledge circulates along numerous channels: primarily in business-to-business relationships, in which knowledge transfer often blends with knowledge co-creation; in interpersonal relationships between people working at enterprises that are not necessarily connected with one another; in the mobility of human resources from one enterprise to another; and in new enterprises that are born as spinoffs, inheriting knowledge from their parent firms (Camuffo & Grandinetti, 2011). The fluid circulation of knowledge gives firms in the cluster an advantage (over firms operating in the same sector outside the cluster) when it comes to improving the quality of their products and processes, and developing innovation. Marshall, who first discovered geographical clusters, described all this with an effective figure of speech as an industrial atmosphere: 'When an industry has thus chosen a locality for itself, it is likely to stay there long: so great are the advantages which people following the same skilled trade get from near neighborhood to one another. The mysteries of the trade become no mysteries; but are as it were in the air, and children learn many of them unconsciously' (Marshall, 1920, p. 225).

But how can we explain the ease with which these cognitive processes take place in clusters? Scholars on clusters have described the factor that explains the industrial atmosphere described by Marshall in various ways, from Dei Ottati's (2003) community market to the relational macroculture of Bell *et al* (2009). Basically, we are talking about a set of aspects relating to the socio-cultural structure of a cluster: a shared language, common values and meanings, and implicit rules of behaviour, that together form a sort of social glue binding clusters together and contributing to their competitive advantage (Dei Ottati, 2003; Porter, 2008). To be more specific, this C-factor (where 'C' can stand for both 'cluster' and 'community') facilitates a mutual understanding between organizations (firms and institutions) activating and developing relationships, and between individuals working at the same or different organizations. By furthering this mutual understanding, the C-factor facilitates knowledge transfer and the production of new knowledge. Suffice it to consider, for example, the problem-solving activity

undertaken by a supplier and a buyer when the former contributes to an innovative process of the latter, or the interaction needed for knowledge entering an enterprise with a new employee arriving from a competitor enterprise to be assimilated or 'accommodated with transformation' effectively, so that it can be used within the recipient organization. If we consider the role of tacit knowledge and face-to-face interaction in these and other examples, it is hardly surprising that clusters – where spatial proximity and cognitive proximity overlap (Boschma, 2005) – should be seen as places where a great deal of tacit knowledge is transferred and co-produced with relative ease (Belussi, 1999; Grandinetti, 2014b). In addition to its cognitive effects, the mutual understanding facilitated by the C-factor also helps to reduce the transaction costs associated with inter-organizational relationships (Dei Ottati, 1994).

The results emerging from the above-mentioned studies on clusters fit in perfectly with our absorptive capacity framework (Figure 1) and its application to SMEs. For a start, the C-factor has a positive impact on cluster firms' interaction quality and relational capability, and also on these firms' prior related knowledge – if we interpret this as both knowledge stock and cognition. Such an interpretation of prior related knowledge is consistent with the definition of this concept suggested by Cohen & Levinthal (1990) and also recalls the cognitive dimension of social capital that Nahapiet & Ghoshal (1998) attribute 'to those resources providing shared representations, interpretations, and systems of meaning among parties' (p. 244). Even disregarding the effect of the C-factor, firms in clusters also tend to be cognitively close to one another in terms of their knowledge stock, given the horizontal dimension of clusters and (to a lesser degree) their vertical dimension too (Camuffo & Grandinetti, 2011).

The cognitive lock-in phenomenon discussed at enterprise level in the theoretical section of this paper has been observed at whole cluster level too (Asheim, 1996). It is a phenomenon that has certainly contributed to the gradual decline of various 'old-world' industrial districts engaging in traditional manufacturing sectors with the advance of globalization (Rabellotti *et al.*, 2009; De Marchi & Grandinetti, 2014). SMEs in clusters need to have a strong knowledge codification capability in order to reinforce their absorptive capacity and extend its range, and we know that they meet with difficulties in this regard. Several scholars have investigated the role of knowledge gatekeepers that certain organisations (firms or institutions) belonging to a cluster can have, supporting the rest of the cluster (Molina-Morales, 2005; Morrison, 2008; Grandinetti, 2011; Boari & Riboldazzi, 2014). Institutional gatekeepers are of particular interest because it is up to them to serve as an effective local–global cognitive interface. These actors must develop a sturdy knowledge codification capability that enables them to work on two fronts: on the one hand to absorb knowledge important to the cluster on an international scale, partly with the support of relationships constructed deliberately for this

purpose; and on the other to transform the absorbed knowledge so that it can be used, in re-codified or tacit form, in the activities and services it delivers to the SMEs in the cluster.

## Conclusion

This work stemmed from the conviction that the absorptive capacity concept enables us to clarify the difference between SMEs and larger enterprises from the knowledge management standpoint. Although it is always being mentioned, this difference is generally attributed, somewhat superficially, to the fact that SMEs rely more heavily on external sources of knowledge. This would be true if such external sources were always used in lieu of internal knowledge creation processes, but large enterprises also nourish their internal knowledge production capacity through equally robust knowledge absorption channels.

We have chosen to define absorptive capacity more restrictively than in the two contributions most often quoted on the topic – that is, the seminal work by Cohen & Levinthal (1990) and its reconceptualization proposed by Zahra & George (2002) – excluding the exploitation of the knowledge absorbed by the enterprise. So here we consider absorptive capacity as including the processes of monitoring, evaluating, and acquiring or committing to memory external knowledge. Taken as a whole, these processes rely on a firm's prior related knowledge (both tacit and codified), and on its relational capability. Knowledge can be absorbed in a codification-driven manner that (in its pure form): is uninfluenced by relationships with outside parties; demands a good knowledge codification capability; and typically intercepts codified external knowledge to commit it to memory, still in codified form. The opposite process is interaction-driven, reliant on relationships, and on the quality of the interactions between the people involved in these relationships; it usually follows the tacit-to-tacit conversion format identified by Nonaka & Takeuchi (1995). There is a third process, a 'hybrid' of the codification-driven and interaction-driven forms, in which relationships serve as a vehicle for absorbing codified knowledge.

Interaction-driven absorption is practically a necessary part of any firm's start-up phase, when founders or founding teams exploit their social capital to mitigate any knowledge gap that firms frequently experience at birth. Afterwards, however, a limited tendency to codify knowledge is a distinctive trait of most SMEs that prevents them from defending their competitive position by adequately exploring useful knowledge sources, and permanently exposes them to the risk of knowledge loss. Signs of cognitive lock-in have even been seen in many geographical clusters, which are populations of interconnected SMEs where the presence of a community dimension (the C-factor) makes the process of interaction-driven absorption more effective.

Judging from the picture that emerges taking our proposed approach to absorptive capacity, the difference

between SMEs and large enterprises raises an important research question in the sphere of knowledge management: How can SMEs develop an adequate knowledge codification capability in alternative ways to those of large

enterprises? The findings of some empirical studies – focusing, for instance, on particular forms of inter-firm cooperation – give us good reason to embark with gusto along this line of research.

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