



Absorptive capacity: a proposed operationalization³

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Abstract

The concept of absorptive capacity has already been considerably studied from a theoretical perspective, but few, if any, attempts at operationalizing the concept have been studied in ways that would allow its full assessment. The more specific focus provided by the four dimensions identified in some recent literature – acquisition, assimilation, transformation and exploitation – opens up some promising avenues for operationalizing the concept. This exploratory research studies and describes case studies of ten innovative companies using a cross-sectional research design. In the first part of the article, we re-examine the concept of absorptive capacity in terms of dynamic capabilities and provide a review of the relevant literature. The second part describes the work accomplished to operationalize the concept of dynamic capability and analyses the possible relationship between the business strategies adopted by the companies studied and their particular strategic capacity.

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Introduction

Since the publication of Cohen & Levinthal's seminal article (1990), the concept of absorptive capacity has been increasingly drawn on by researchers to explain a number of organizational phenomena. The concept has been mainly studied from a theoretical perspective and has not been operationalized in ways that would allow for a full understanding of the four dimensions identified by Zahra & George (2002): acquisition, assimilation, transformation and exploitation.

The research carried out by our team was exploratory in nature. Owing to the relatively small number of companies studied, the information collected needed to be meaningful, with close attention being paid to the consistency and complementarity of sources. The case study approach was used because it allowed for the use of different contexts (Hlady Rispal, 2000). The companies selected are all in the same industry sector (software production and application) and have been identified as innovative businesses – all of them having received funding support from OSEO, the French National Innovation Agency, which is a publicly owned organization reporting to both the Ministry for Economy, Finance and Industry and the Ministry for Higher Education and Research.

In the first part of the article, the concept of absorptive capacity is framed in terms of dynamic capability and a review of the relevant literature is proposed. In the second part, the concept of dynamic capability is operationalized and is followed by an analysis of the possible

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linkage between business strategies adopted by the companies in the sample and their particular strategic capacities.

The postulate on which the dynamic capability approach is based is that the internal potential of a company is a determining factor in the competitive advantages it can gain by cultivating its capacity to deal with changes in its environment.

The concept of dynamic capability

Teece *et al.* (1997) define dynamic capability in terms of the ability to integrate, build and reconfigure internal and external competencies to a changing environment. These researchers see dynamic capabilities as being capacities that are closely tied in with the organizational processes and resources of companies.

Eisenhardt & Martin (2000) adopt a similar approach to Teece *et al.* (1997), while focussing not on abilities or competencies but rather on organizational or strategic processes and routines that allow a firm's resources to be reconfigured in response to changing market realities. Their analysis puts the accent on the intrinsic characteristics of processes that provide the basis for dynamic capabilities, processes that support the development of or access to new knowledge, or facilitate new product development. For Eisenhardt & Martin (2000), dynamic capability corresponds to the existence of identifiable and specific routines that are fundamental to activities such as knowledge creation and acquisition, or the capacity to develop strategic alliances or partnerships.

In their later study of dynamic capability, Zollo & Winter (2002) extend the operationalization of the concept by introducing the construct of 'methods'. For them, a dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines in pursuit of improved effectiveness.

These different definitions of dynamic capability show that it can be seen either as organizational or systemic (system-related) skills whose role is to create, build up or reconfigure the resources of a system so as to better address changes in its environment. Dynamic capabilities can draw on various clearly identifiable processes, activities or methods that address specific needs that could, for example, be met by the development of new knowledge or, conversely, by discontinuing certain practices that have essentially become irrelevant. For Zollo and Winter (2002), these dynamic capabilities are the result of an organizational learning process, one of the key elements in the capacities-based transfer model. We believe it should be possible to apply the knowledge learned from the study of dynamic capability to knowledge transfer.

According to Parent *et al.* (2007), every capacity in a transfer system is built on processes, activities or methods, and this is equally true for dynamic capability. When looked at from this perspective, dynamic capability can be seen as stemming from or being an integral

part of certain internal processes specific to a system – and can be associated with one or more capacities.

This premise has led us to characterize the dynamic capability relating to learning as being the absorptive capacity, as Zahra & George (2002) do when they define absorptive capacity as being a dynamic capability that influences and sustains the competitive advantage of a company.

From dynamic capability to absorptive capacity

Absorptive capacity can also be qualified as 'the capacity to recognize the value of new external information, assimilate it and apply it to commercial ends' (Cohen & Levinthal, 1990, p. 128). This is an allusion to the range of routines and organizational processes through which a business or a system acquires, assimilates, transforms and exploits knowledge in order to produce a dynamic organizational capability (Zahra & George, 2002). These researchers validate the idea that the concept is multi-dimensional and in fact comprises a range of dimensions and abilities. Lane & Lubatkin (1998) draw on the same bases as Cohen & Levinthal (1990) for their study of what is required for firms to learn from other firms. Van Den Bosch *et al.* (2005) also propose a definition of absorptive capacity based on three crucial components: the capacity to recognize the value of external knowledge, the capacity to assimilate it and the capacity to apply it for commercial purposes. This is what Kim qualifies as the capacity of organizations to learn and to solve problems (Kim, 1998). A number of different studies have demonstrated the connection between absorptive capacity and organizational performance (Cohen & Levinthal, 1990; Levinson & Asahi, 1995; Mowery & Oxley, 1995; Mukherjee *et al.*, 2000). Furthermore, absorptive capacity is also recognized as being one of the fundamentals of technical learning inside organizations (Kedia & Bhagat, 1988; Veuglers & Cassiman, 1999).

For an organization to increase its absorptive capacity, it needs to boost its ability to transform and implement external knowledge within the company so as to enhance its core competencies (Daghfous, 2004). An organization that wants to make effective use of the sources that can boost its absorptive capacity needs to focus strongly on the communications interface between the external environment, the company as a whole and its constituent units (Cohen & Levinthal, 1990; Grant, 1991; Levinson & Asahi, 1995). Furthermore, organizational culture is considered to be one of the determinants of the effectiveness of organizational transfer (Kedia & Bhagat, 1988); organizational cultures can thus either facilitate learning and change in a system or, on the contrary, act as counterweights that impede it (Levinson & Asahi, 1995). In fact, when a primarily resource-based view is adopted, some authors consider that the interactions and connections that firms build with outside organizations can strengthen their absorptive capacity and improve the effectiveness of the transfer process (Hamel & Prahalad, 1989; Hamel, 1991; Levinson & Asahi, 1995).

There does exist a certain degree of consensus about absorptive capacity between researchers in different studies. Earlier research studies generally agree on the definition of the concept and on the description of its role and its results (Volberda *et al.*, 2010). Absorptive capacity is a fundamental concept in the study of organizational learning, from both theoretical and practical standpoints.

The dimensions of an organization's absorptive capacity

Zahra & George (2002) identified four dimensions of absorptive capacity: acquisition, assimilation, transformation and exploitation. They then proposed a new way of framing the concept by distinguishing between potential (acquisition and assimilation of knowledge) and achieved (transformation and exploitation) absorptive capacity.

Acquisition is defined as being the capacity to recognize, understand the importance of, and acquire the external knowledge needed for the operations of an organization (Lane & Lubatkin, 1998; Zahra & George, 2002). Hamel (1991) sees the acquisition of new, specialized knowledge as a motivator for interorganizational collaboration. Welsch *et al.* (2001) describe acquisition as being a generator of knowledge for an organization. Acquisition can occur as a result of investment in R&D or through prior knowledge.

Assimilation refers to a firm's capacity to integrate external knowledge using routines and processes that allow it to understand, analyse, process and interpret information obtained from external sources (Zahra & George, 2002). They suggest that the number of publications where a firm makes reference to research carried out by others could be used to determine its success in this area.

Transformation is a firm's capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge. This goal can be achieved by the addition or suppression of knowledge, or the reinterpretation of existing knowledge. It requires two fundamental elements: internalization and conversion. Zahra & George (2002) suggest that an indicator of a firm's degree of success in transformation could be the number of ideas or research projects centred on new products.

Exploitation is a firm's capacity to competitively use new external knowledge to achieve its organizational goals (Lane & Lubatkin, 1998). Routines create an environment that allows firms to refine, extend and leverage existing competencies, or develop new ones by incorporating acquired and transformed knowledge into their operations (Zahra & George, 2002). These researchers propose using the number of patents obtained or new products announced as an indicator of a firm's degree of success in this area.

Factors affecting absorptive capacity

Absorptive capacity is influenced by both internal and external factors (Daghfous, 2004). Internal factors include the prior knowledge base, individual absorptive capacity, the level of education and academic qualifications of employees, the diversity of their backgrounds, the particular role played by gatekeepers, organizational structures, levels of cross-functional communication, organizational culture, company size, organizational inertia, investment in R&D, and human resource management. External factors are a combination of the external knowledge environment and the company's position within the relevant knowledge networks.

Lin *et al.* (2002) find that firms cannot successfully integrate and apply external knowledge unless they possess a high level of absorptive capacity. The authors studied the critical factors needed for absorptive capacity in situations in which transfers occur (in technology transfer, for example) and found convincing associations between absorptive capacity and factors such as diffusion channels for external technology, organizational interaction mechanisms and R&D resources.

In addition to the correlation made between absorptive capacity and R&D, the literature now available extends the concept to include, among other things, employee skills and motivation (Minbaeva & Michailova, 2004), prior knowledge (Lane *et al.*, 2001), relevance of the knowledge, similarities between organizational structures, and shared research communities (Lane & Lubatkin, 1998).

Exploratory learning is an essential aspect of any organization's capacity to create variety and adapt (McGrath, 2001). Van Den Bosch *et al.* (1999) identify three characteristics in the absorption of knowledge: its efficiency, scope and degree of flexibility (p. 552). Efficiency in the absorption of knowledge refers to how firms identify, assimilate and exploit knowledge from a cost and economies of scale perspective, and scope refers to the breadth of component knowledge a firm draws upon. Flexibility refers to the extent to which a firm can access additional, and reconfigure existing, component knowledge. Van Den Bosch *et al.* (1999, p. 552) argue that the characteristics of flexibility and scope in the absorption of knowledge can be seen to be strongly associated with organizational knowledge structures that are exploratory in nature (March, 1991), whereas efficiency is more closely linked to adaptations leading to exploitation.

Tsai (2001) develops more of a network perspective and contends that organizational units can produce more innovations and enjoy better performance if they occupy central network positions; this enables them to access new knowledge developed by other organizations, although they remain fundamentally dependent on their own absorptive capacity and ability to successfully replicate the new knowledge.

Following our review of the literature, we developed, and present in Table 1, a summary overview of the different characteristics of absorptive capacity.

Table 1 Breakdown of dimensions of absorptive capacity, from a review of the literature

<i>Dimensions</i>	<i>Defining characteristics</i>	<i>Indicators</i>	<i>Authors</i>	
Acquisition	Prior investments	<ul style="list-style-type: none"> • Risk tolerance • Senior management support • Training • Investment in R&D 	Cohen & Levinthal (1990); Song & Parry (1993); Mowery & Oxley (1995); Kim (1998); Kavan <i>et al.</i> (1999); Giroud (2000); Lahti & Beyerlein (2000); Zahra & George (2002)	
	Prior knowledge	<ul style="list-style-type: none"> • Knowledge repertory • Intensity of knowledge • Experience within the R&D department • Highest academic degree held by employees 		
	Motivation for collecting knowledge	<ul style="list-style-type: none"> • Levels of motivation • Observation • Speed of learning 		Cohen & Levinthal (1990); Mohr & Spekman (1994); Stock <i>et al.</i> (2001); Szulanski (2000); Zahra & George (2002)
	Direction of knowledge	<ul style="list-style-type: none"> • Circulation of knowledge 		
Assimilation	Absorption	<ul style="list-style-type: none"> • Interpretation • Understanding • Formalization 	Cohen & Levinthal (1990); Dodgson (1993); Szulanski (1996, 2000); Kim (1998); Lane & Lubatkin (1998); Gruenfeld <i>et al.</i> (2000)	
	Understanding			
Transformation	Internalization	<ul style="list-style-type: none"> • Recodification • Challenging established thinking or practices • Adaptability 	Kim (1998); Gruenfeld <i>et al.</i> (2000); Salk & Brannen (2000)	
	Conversion			
Exploitation	Use	<ul style="list-style-type: none"> • Mobilization of resources 	Cohen & Levinthal (1990); Dodgson (1993); Szulanski (1996, 2000); Kim (1998); Lane & Lubatkin (1998); Gruenfeld <i>et al.</i> (2000)	
	Implementation	<ul style="list-style-type: none"> • Core competencies 		

Many different authors have written about absorptive capacity, although few have tried to operationalize the concept (Chauvet, 2003). At the same time, the four characteristics identified by Zahra & George (2002) open up some interesting prospects.

The research carried out by Zahra & George (2002) drew attention to four intrinsic characteristics of absorptive capacity: acquisition, assimilation, transformation and exploitation. In reference to these characteristics, and drawing on our review of the literature, we have grouped together in Table 2 the variables that can be associated with each characteristic.

Given that, as seen from the angle of the resource-based theory (Wernerfelt, 1984), information, information sources, competencies, experiences and management processes are generators of competitive and performance advantages, our premise would be that the greater a company's absorptive capacity for information, the longer the competitive advantages it develops will last. Moreover, Lewin *et al.* (2004) have shown that innovative companies have a far more highly developed and distinctly superior capacity for learning than firms that are simply 'imitators'. These researchers also emphasize the strong connection between a firm's capacity for innovation and its absorptive capacity.

The empirical study

Our theoretical study enabled us to operationalize the concept of absorptive capacity. The goal of our research – the first findings from which constitute the basis for this current exploratory study – is ultimately that of developing an instrument for measuring absorptive capacity in companies. With this goal in mind, our exploratory study explores the links, where they exist, between companies' absorptive capacity and their business strategy and proposes an initial operational grid for measuring absorptive capacity (Appendices A and B). The grid was supplemented by a complementary tool in the form of an interview focusing more closely on the strategic dimensions of business management.

Methodology

The opportunity for the authors to conduct research in partnership with France Télécom on the management of innovative projects provided them access to a case base containing 110 relatively small technological enterprises. This opportunity developed our interest in innovative organizations in the software application sector in France.

Over the past 30 years the software application industry, along with the software services industry, has

positioned itself among the leading industrial forces throughout much of the world.

This sector represents a number of particular characteristics:

- (1) A relatively high degree of environmental uncertainty (Shan *et al.*, 1994).
- (2) An access to hard-to-codify tacit knowledge through, among other things, strategy, technology and operations necessary for their success (Liebeskind *et al.*, 1996).
- (3) A high rate of innovation. The commercialization of emergent technologies is characterized by fierce competition for innovative products and services.
- (4) Organizations with access to multiple sources of financing, including internal and external, such as stock options and venture capital.
- (5) A growing number of organizations managed by scientists (Fisher, 1996): the manager is at once manager and researcher.

Table 3 shows the profile used to identify our research sites.

The total case inventory available to the researchers contained 110 organizations on which to base the feasibility of our study.

Total number of organizations available to the researchers	110	Corresponds to the number of organizations accessible and for which senior management is available to the researchers
Those organizations meeting the parameters established for the study	70	40 organizations did not qualify for the innovation experience requirement
Organizations conducting business primarily in the software	48	22 organizations do not have software development as their prime purpose
Organizations able to serve as research sites	33	15 organizations had severe financial difficulties
Organizations for which access to data was possible	17	16 organizations did not want, or were unable, to provide unlimited access to data
Organizations selected for the research	10	7 organizations were eliminated for various reasons including (being in the course of strategically aligning with another organization, in the process of changing the executive team, etc.)

Open interviews were our choice of structure for carrying out the study. To more easily distinguish between the different assumptions explored on the basis of this approach, each interview was 'classified', an expression we prefer to the term 'coded', even though our approach comes close to the open coding used by Glaser & Strauss (Glaser & Strauss, 1967; Strauss &

Corbin, 1990) or the techniques of categorization and qualification proposed by Huberman & Miles (1991). Our goal was to enable the people being interviewed to express their views on the structural themes raised in the initial questions, and that emerged in the course of the interviews. The structural dimensions identified were: acquisition, assimilation, transformation and exploitation. For each of these characteristics, we pinpointed key associated variables identified in our review of the literature as being compelling indicators (number of patents, routinization, etc.).

Interview data were analysed using a thematic content analysis method (L'Écuyer, 1987). The important units of analysis were not necessarily specific words or phrases but rather units of meaning: they could be words, concepts, events, or sequences of events, together with the argumentation structure relating to them. The groupings adopted were fundamentally a reflection of the researchers' desire for optimum latitude in conducting process and content analyses of the phenomena. They also felt it important to retain and remain sensitive to the semantic patterns of significance to the people involved (Pharo, 1997, p. 133) and to respect the insights conveyed both by the meaning of the everyday words people used and by the images conjured up in their argumentation. Structures of this kind are clearly more reliable when applied by researchers who, having participated in interviews, are well-placed to 'interpret' the meaning of specific remarks because they can take the climate of those interviews into account. Researchers from the team were responsible for the application of the structures used (agreement as to the meaning of words or phrases employed and comments made, or recognition of the aptness of the choice of a category, etc.). In all, approximately 30h of interviews were conducted with ten company CEOs; each interview took place in two separate sessions, 2–4 weeks apart.

The theoretical study we carried out led to our operationalization of the concept of absorptive capacity (Appendix B). The grid so developed was then applied in the interviews with the ten company CEOs. To supplement the interview grid, while also extending and validating our own observations, each CEO was also asked to talk about the particular strategies he employed. Our initial exploratory sample of companies was composed of small and medium-sized businesses with between 25 and 160 employees.

Main results

Eight of the ten firms stated that they had adopted a mixed management strategy for R&D, both internally and externally, through alliances and partnerships, as well as collaboration with university-based laboratories. A CEO from one of these eight firms declared, '... There's no way we could bring together all the know-how we need inside the company, so this is a good way to garner skills. I encourage my engineers to get involved

Table 2 Dimensions of absorptive capacity, with associated variables

<i>Dimensions</i>	<i>Key characteristics</i>	<i>Associated variables</i>
Acquisition	<ul style="list-style-type: none"> • Recognition and understanding of the new external knowledge • Appreciation of its value, and acquisition of the external knowledge 	<ul style="list-style-type: none"> • External sources background • Nature of external knowledge • Type of new knowledge • Prior investments • Prior experience • Acquisition of licenses • Contractual agreements • Alliances and other interrelationships or joint ventures • Actors' motivations • Organizational culture • Common and shared language • R&D intensity • Familiarity with organizational problems • Personnel turnover • Participation in decision-making • Ability to detect opportunities in the environment (expectation formation) • Position of the firm in the network
Assimilation	<ul style="list-style-type: none"> • Assimilation of the external knowledge and its intrinsic value • Integration of the external knowledge 	<ul style="list-style-type: none"> • Routinization • Coordination capacity • Personnel turnover • Number of patents pending • Number of research and/or practice communities • Management support
Transformation	<ul style="list-style-type: none"> • Transformation of the knowledge through the development of routines • Combination of existing knowledge with assimilated knowledge • Addition or removal of knowledge to allow new interpretations • Internalization and conversion of information 	<ul style="list-style-type: none"> • Development of new products • Diversification • Routines for knowledge creation • Number of new ideas
Exploitation	<ul style="list-style-type: none"> • Application of the assimilated external knowledge • Achievement of organizational goals • Creation of new knowledge by integrating acquired and converted knowledge 	<ul style="list-style-type: none"> • Number of patents filed • Number of new products • Protection systems

Table 3 Primary parameters of sampling used

<i>Characteristics of our sample</i>	<i>Informants</i>	<i>Period</i>
<ul style="list-style-type: none"> • Young enterprises (less than 5 years) • In the software industry • Financed by risk capital • Having submitted one or more patent on their innovations 	<ul style="list-style-type: none"> • Innovative CEO • Researchers • Technicians and marketers • When possible we met with clients 	<ul style="list-style-type: none"> • Start-up phase or at the very least in the phase of developing innovative products or services

in at least one joint research program. ... At the conclusion of each of them, reports are produced, then discussed, and the discussions at times lead to changes, sometimes even ruthless changes, in the way we do things' (CEO 4).

The initial interviews with these company officers revealed that decisions about external cooperation

projects are the result of deliberate management choices, possibly linked to the personalities of the CEOs concerned. What is striking is that the companies that deliberately pursue strategies of openness to external interactions are also those with the highest growth rates in the sample (in sales figures and in the number of employees).

These businesses all display strong adaptive capacities, and the conflict management strategies they use within their partnerships stem from previous experience: 'Petty conflicts are easy to avoid, usually through discussion of the issues involved, and even when a conflict is more serious, we invariably find ways to settle our differences' (CEO 7); 'If there is agreement on the desired outcomes, we can work with any partner; sure, everyone has their own way of doing things, but there are always common threads for working successfully together...'

The issue of trust came up frequently during the interviews. Six of the eight CEOs referred to it with no prompting from the interviewers, when talking about experiences with their external partners and their own people. Each of them saw trust as being fundamental to their relationships and felt that shared trust between those involved was indispensable: '... If we couldn't trust the people we are working with, we would be stuck in a permanent state of renegotiation of expectations and obligations. Trust is the glue that binds agreements together and helps avoid conflicts... ' (CEO 9). In their internal relations, all the CEOs trusted the people working for them; they felt this was both a motivating factor for their employees and a situation that allowed them intellectual freedom.

The CEOs we interviewed all credited specific employees, whom they were able to identify by name, as having contributed significantly to either the dissemination of external knowledge or its assimilation in one area or another: '... Marc, the director of our research unit, keeps a close watching brief on external information; he and Thierry will often come up with new product ideas, and the team backs them up one hundred per cent...' (CEO 1). In the words of another CEO, '... José really is the person people turn to for advice when nothing else seems to work; he can always suggest how we could use this or that approach that worked for some other company ... ' (CEO 8).

All the CEOs from the group of eight firms stressed the importance of maintaining quality contacts with clients at the end of the process, this being the best moment to identify new needs or gauge interest in new product ideas. For these senior company officers, new product development must of necessity constitute a response to client or market needs. At the same time, it also calls for strategies that allow a firm to keep abreast of whatever innovations the competition is implementing. These are situations where product development can often be rapid, with results sometimes better than what the rival company has achieved.

In spite of the limited size of the sample, it is also interesting to note that two of the firms chose to focus on diversification. Neither adopted a mixed management strategy for its R&D; one used internal management and the other an external management approach.

The need to change ways of carrying out work, as a result of internal or external innovations, was perceived

as a benefit by the group of eight CEOs, all of whom maintained that, in their respective ways, they had the capacity to modify processes and strategies, when needed: '... Calling yourself into question is tough, but that's what you have to do to survive...' (CEO 5).

The interviewees adopted a more critical attitude when results were reviewed as part of the breakdown of variables. Eight of them identified two variables they felt were irrelevant ('patents pending' and 'patents filed'), arguing that obtaining patents was basically an unproductive exercise for small businesses, given confidentiality issues, the need to protect their own specific expertise, and simply the costs associated with filing and renewing patents.

Discussion

At the conclusion of these interviews, we were in a position to identify conditions required for the creation of new knowledge. Three factors are of particular importance: the creation of an environment conducive to effective interaction, the presence of leaders with the skills needed to ensure needed integration and direction in situations of creative chaos, and the capacity for ongoing self-challenge.

Being open to outside influences, encouraging free-flowing and frequent interactions at all levels and creating opportunities for the expression of a range of opinions are all crucial factors in the capability of a firm to generate new knowledge. Caloghirou *et al.* (2004) studied the relative effectiveness of specific mechanisms of knowledge creation and knowledge transfer used by firms, and their effect on the firms' levels of innovation.

Lin *et al.* (2002) also see interactions and linkages as being key to the creation and integration of knowledge. They have shown that organizational culture plays a decisive role in the nature and quality of interactions (Lin *et al.*, 2002). Kodama (2005) argues that easily used informal and fluid linkages need to be developed between networks of strategic communities for new knowledge to be developed because formal, more bureaucratic, structures are not often conducive to effective learning.

For their part, Cavusgil *et al.* (2003) stress the need for the existence of relations of trust between the people or groups involved, while, in addition, Kodama (2005, p. 38) focuses on the vital importance of characteristics such as flexibility and speed.

Above all, the development of new organizational knowledge requires leaders with the capacity to manage diverse ways of thinking and acting and to provide effective direction to the new forms of knowledge that can emerge as a result. Beech *et al.* (2002) consider that constructive conflicts are an important instrument for generating new knowledge. In the case of employees who might be described as contributing to awareness and transfer of external knowledge, we believe that, contrary to what could be deduced from a rapid reading of the interview transcripts, this is not simply a question of leadership, but in fact a reflection of the capacity to

manage and integrate external knowledge. Kodama (2005) and Joffres *et al.* (2004) come to the very same conclusion and also point out the important role played by leaders of strategic communities in the constructive management of disagreement. Hussi (2004), for his part, stresses the need for people to be able to challenge their own ways of thinking or acting and reframe problems and solutions, if they want to be innovators.

One point that has not been addressed in the literature is the issue raised in some interviews of the need for maintaining quality contacts with clients or the market at the end of the process. This kind of contact fulfils a dual purpose: to identify new needs or gauge interest in new ideas. The same can be said of the strategy of maintaining watching briefs, summed up somewhat succinctly in reference to the attitude of one employee 'who always has an ear to the ground to pick up on what's happening outside'. The operationalization of these latter variables would give additional weight to any future model adopted.

Conclusion

Our preliminary overview brings out the fact that companies that are the most open (and whose leaders are most open) inspire a strong absorptive capacity and thereby develop a greater capacity for innovation. This was the case for eight of the ten firms in the sample. As this preliminary research focused on innovative small

and medium-sized businesses, one of the limitations of the study could be the issue of the personality of their particular CEOs. At the same time, choices about adopting strategies of openness and encouraging employees to work with external partners clearly reflected significant overall managerial commitment. This is certainly the first finding to be drawn from our research, one that we will bear in mind and validate in future analyses.

Another issue that calls for further and more in-depth analysis is the role of trust in the operationalization of absorptive capacity. Does it in fact affect this capacity – and if so, how? Was it simply specific to the sample group of small and medium-sized businesses studied, or to the heads of those firms? Would it be useful to investigate the existence of a possible interrelationship between trust and routines or procedures that integrate external knowledge? In spite of the limits inherent in a preliminary analysis based on such a small sample, the contribution of this particular research study lies in its opening up the possibility of developing a grid to operationalize the assessment of absorptive capacity. It should ultimately lead to the development of an instrument that can be used to assess the absorptive capacity of all companies. The availability of tools of this kind to measure absorptive capacity has the potential to open up some promising avenues for research on organizational learning and its effectiveness, or on the capacity for innovation in different firms.

References

- AUTIO E, HAMERI A-P and VUOLA O (2004) A framework of industrial knowledge spillovers in big-science centers. *Research Policy* **33**(1), 107–126.
- BEECH N, MACINTOSH R, MACLEAN D, SHEPHERD J and STOKES J (2002) Exploring constraints on developing knowledge: on the need for conflict. *Management Learning* **33**(4), 459–475.
- CALOGHIROU Y, KASTELLI I and TSAKANIKAS A (2004) Internal capabilities and external knowledge sources: complements or substitutes for innovative performance? *Technovation* **24**(1), 29–39.
- CAVUSGIL ST, CALANTONE RJ and ZHAO Y (2003) Tacit knowledge transfer and firm innovation capability. *Journal of Business & Industrial Marketing* **18**(1), 6–21.
- CHAUVET V (2003) Construction d'une échelle de mesure de la capacité d'absorption. In *Proceedings of the 12th AIMS Conference* (MEZGHANI L, Ed), pp 1–29, Sfax, Tunisia. http://aims.uniservice.fr/index.php?option=com_content&task=blogcategory&id=115&Itemid=106 (accessed 8 January 2007).
- CHEN C-J (2004) The effects of knowledge attribute, alliance characteristics, and absorptive capacity on transfer performance. *R&D Management* **34**(3), 311–321.
- COHEN WM and LEVINTHAL DA (1990) Absorptive capacity: a new perspective on learning and innovation. *Administrative Science Quarterly* **35**(1), 128–152.
- DAGHFOUS A (2004) Organizational learning, knowledge and technology transfer: a case study. *The Learning Organization* **11**(1), 67–83.
- DAVENPORT TH, DE LONG DW and BEERS MC (1998) Successful knowledge management projects. *Sloan Management Review* **39**(2), 43–57.
- DODGSON M (1993) Organizational learning: a review of some literatures. *Organization Studies* **14**(3), 375–394.
- DYER JH and SINGH H (1998) The relational view: cooperative strategy and sources of interorganizational competitive advantage. *The Academy of Management Review* **23**(4), 660–679.
- EISENHARDT KM and MARTIN JA (2000) Dynamic capabilities: what are they? *Strategic Management Journal* **21**(10/11), 1105–1121.
- FISHER LM (1996) How strategic alliance work in biotech. *Journal of Strategy and Business*. <http://www.strategy-business.com/issue/1q96> (accessed 24 November 2010).
- GIROUD A (2000) Japanese transnational corporations' knowledge transfer to Southeast Asia: the case of the electrical sector in Malaysia. *International Business Review* **9**(5), 571–586.
- GLASER BG and STRAUSS AL (1995) La production de la théorie à partir des données. *Enquête* **1**, 183–195.
- GRANT RM (1991) The resource-based theory of competitive advantage: implications for strategy formulation. *California Management Review* **33**(3), 114–135.
- GRUENFELD DH, MARTORANA PV and FAN ET (2000) What do groups learn from their worldliest members? Direct and indirect influence in dynamic teams. *Organizational Behavior and Human Decision Processes* **82**(1), 45–59.
- HAMEL G (1991) Competition for competence and interpartner learning within international strategic alliances. *Strategic Management Journal* **12**(Summer Special Issue), 83–103.
- HAMEL G and PRAHALAD CK (1989) Strategic intent: to revitalize corporate performance, we need a whole new model of strategy. *Harvard Business Review* **67**(3), 63–76.
- HLADY RISPAL M (2000) Une stratégie de recherche en gestion: l'étude de cas. *Revue Française de Gestion* **127**(1), 61–70.
- HUBERMAN AM and MILES MB (1991) *Analyse des données qualitatives*. De Boeck-Wesmael: Bruxelles.
- HUSSI T (2004) Reconfiguring knowledge management – combining intellectual capital, intangible assets and knowledge creation. *Journal of Knowledge Management* **8**(2), 36–52.
- JOFFRES C, HEATH S, FARQUHARSON J, BARKHOUSE K, HOOD R, LATTER C and MACLEAN DR (2004) Defining and operationalizing capacity for

- heart health promotion in Nova Scotia, Canada. *Health Promotion International* **19**(1), 39–49.
- KAVAN CB, SAUNDERS CS and NELSON RE (1999) virtual@virtual.org. *Business Horizons* **42**(5), 73–82.
- KEDIA BL and BHAGAT RS (1988) Cultural constraints on transfer of technology across nations: implications for research in international and comparative management. *Academy of Management Review* **13**(4), 559–571.
- KIM L (1998) Crisis construction and organizational learning: capability building in catching-up at Hyundai Motor. *Organization Science* **9**(4), 506–521.
- KODAMA M (2005) Knowledge creation through networked strategic communities: case studies on new product development in Japanese companies. *Long Range Planning* **38**(1), 27–42.
- LAHTI RK and BEYERLEIN MM (2000) Knowledge transfer et management consulting: a look at the firm. *Business Horizons* **43**(1), 65–80.
- LANE P, SALK JE and LYLES MA (2001) Absorptive capacity, learning, and performance in international joint ventures. *Strategic Management Journal* **22**(12), 1139–1161.
- LANE PJ and LUBATKIN M (1998) Relative absorptive capacity and interorganizational learning. *Strategic Management Journal* **19**(5), 461–477.
- L'ÉCUYER R (1987) L'analyse de contenu: notions et étapes. In *Les méthodes de la recherche qualitative* (DESLAURIERS JP, Ed), pp 49–65, Presses de l'Université du Québec, Sillery.
- LEVINSON NA and ASAHU M (1995) Cross-national alliances and inter-organizational learning. *Organizational Dynamics* **24**(2), 50–64.
- LEWIN AY, WEIGELT CB and EMERY JB (2004) Adaptation and selection in strategy and change: perspectives on strategic change in organizations. In *Handbook of Organizational Change and Innovation* (POOLE MS and VAN DE VEN AH, Eds), pp 108–160, Oxford University Press, Oxford.
- LIEBESKIND JP, OLIVER AL, ZUCKER L and BREYER M (1996) Social networks, learning and flexibility: sourcing scientific knowledge in new technology firms. *Organization Science* **7**(4), 428–443.
- LIN C, TAN B and CHANG S (2002) The critical factors for technology absorptive capacity. *Industrial Management & Data Systems* **102**(6), 300–308.
- MARCH JG (1991) Exploration and exploitation in organizational learning. *Organizational Science* **2**(1), 71–87.
- MCGRATH RG (2001) Exploratory learning, innovative capacity, and managerial oversight. *Academy of Management Journal* **44**(1), 118–131.
- MINBAEVA DB and MICHAILOVA S (2004) Knowledge transfer and expatriation in multinational corporations: the role of disseminative capacity. *Employee Relations* **26**(6), 663–679.
- MOHR J and SPEKMAN R (1994) Characteristics of partnership success: partnership attributes communication behaviour and conflict resolution techniques. *Strategic Management Journal* **15**(2), 135–152.
- MOWERY DC and OXLEY JE (1995) Inward technology transfer and competitiveness: the role of national innovation systems. *Cambridge Journal of Economics* **19**(1), 67–93.
- MUKHERJEE A, MITCHELL W and TALBOT FB (2000) The impact of new manufacturing requirements on production line productivity and quality at a focused factory. *Journal of Operations Management* **18**(2), 139–168.
- PARENT R, ROY M and ST-JACQUES D (2007) A systems-based dynamic knowledge transfer capacity model. *Journal of Knowledge Management* **11**(6), 81–96.
- PHARO P (1997) *Sociologie de l'esprit*. PUF, Paris, France.
- SALK JE and BRANNEN MY (2000) National culture, networks, and individual influence in a multinational management team. *Academy of Management Journal* **43**(2), 191–202.
- SHAN W, WALKER G and KOGUT B (1994) Interfirm cooperation and start-up innovation in the biotechnology industry. *Strategic Management Journal* **15**(5), 387–394.
- SONG XM and PARRY ME (1993) How the Japanese manage the R&D-marketing interface. *Research Technology Management* **36**(4), 32–38.
- STOCK GN, GREIS NP and FISCHER WA (2001) Absorptive capacity and new product development. *The Journal of High Technology Management Research* **12**(1), 77–91.
- STRAUSS A and CORBIN J (1990) *Basics of Qualitative Research*. Sage, Newbury Park, CA.
- SZULANSKI G (1996) Exploring internal stickiness: impediments to the transfer of best practice within the firm. *Strategic Management Journal* **17**(Winter Special Issue), 27–43.
- SZULANSKI G (2000) The process of knowledge transfer: a diachronic analysis of stickiness. *Organizational Behavior and Human Decision Processes* **82**(1), 9–27.
- TEECE DJ, PISANO G and SHUEN A (1997) Dynamic capabilities and strategic management. *Strategic Management Journal* **18**(7), 509–533.
- TAI W (2001) Knowledge transfer in intraorganizational networks: effects of network position and absorptive capacity on business unit innovation and performance. *Academy of Management Journal* **44**(5), 996–1004.
- VAN DEN BOSCH FAJ, VAN WIJK R and VOLBERDA HW (2005) Absorptive capacity: antecedents, models, and outcomes. In *Handbook of Organizational Learning and Knowledge Management* (EASTERBY-SMITH M and LYLES M, Eds), pp 278–301, Blackwell Publishing, Oxford.
- VAN DEN BOSCH FAJ, VOLBERDA HW and DE BOER M (1999) Coevolution of firm absorptive capacity and knowledge environment: organizational forms and combinative capabilities. *Organization Science* **10**(5), 551–568.
- VEUGLERS R and CASSIMAN B (1999) Make and buy in innovation strategies: evidence from Belgian manufacturing firms. *Research Policy* **28**(1), 63–80.
- VOLBERDA HW, FOSS NJ and LYLES MA (2010) Absorbing the concept of absorptive capacity: how to realize its potential in the organization field. *Organization Science* **21**(4), 931–951.
- WELSCH H, LIAO J and STOICA M (2001) Absorptive capacity and firm responsiveness: an empirical investigation of growth-oriented firms. In *Proceedings of the 2nd USASBE/SBIDA Conference*, pp 1–19. ICSB: Orlando, FL.
- WERNERFELT B (1984) A resource-based view of the firm. *Strategic Management Journal* **5**(2), 171–180.
- ZAHRA SA and GEORGE G (2002) Absorptive capacity: a review, reconceptualization, and extension. *Academy of Management Review* **27**(2), 185–203.
- ZOLLO M and WINTER SG (2002) Deliberate learning and the evolution of dynamic capabilities. *Organization Science* **13**(3), 339–351.

Appendix A

Table A1 Results of the item-by-item analysis of replies given during interviews after a breakdown of their associated variables

Associated variables	Interview number assigned to CEO									
	1	2	3	4	5	6	7	8	9	10
Sources of prior knowledge	X	X	X	X	X	X	X	X	■	X
Nature of external knowledge	X	X	X	X	X	X	■	X	X	X
Type of new knowledge	■	X	X	X	X	X	■	X	■	X
Prior investments	X	X	X	X	X	X	X	X	X	X
Prior experience	X	X	X	X	X	X	X	X	X	X
Acquisition of licenses	X	X	■	X	■	X	X	X	■	X
Contractual agreements	X	X	■	■	■	X	■	■	■	X
Alliances and other interrelationships or joint ventures	X	X	■	X	X	■	X	X	X	X
Motivations of people involved	X	X	X	X	■	■	X	X	X	X
Organizational culture	■	X	X	X	X	X	X	X	X	X
Common and shared language	X	X	X	X	X	X	X	X	X	■
R&D intensity	X	X	X	X	X	X	X	X	X	X
Familiarity with organizational problems	X	X	■	X	X	■	X	X	■	X
Personnel turnover	X	X	■	X	X	■	X	X	X	■
Participation in decision-making	X	X	■	X	X	■	X	■	X	■
Capacity to detect opportunities in the environment	X	X	X	■	■	X	■	■	X	X
Position of the firm in the network	X	■	■	■	X	■	X	X	X	X
Routinization	X	X	X	X	X	■	X	X	X	■
Coordination capacity	X	X	■	X	X	■	X	X	X	X
Number of patents pending	3	1	0	2	1	0	2	2	3	1
Number of research and/or practice communities	2	2	1	1	2	1	2	1	3	2
Management support	X	X	■	X	■	X	X	X	X	X
Development of new products	X	X	X	X	X	X	X	X	X	X
Diversification	X	X	■	X	X	X	■	X	X	X
Routines for knowledge creation	X	X	X	X	X	X	X	X	X	X
Number of new ideas	X	X	■	X	X	■	X	X	X	■
Number of patents filed	6	3	4	4	8	3	5	2	4	0
Number of new products	3	2	1	2	2	2	1	4	3	2
Protection systems	X	X	X	X	X	X	X	X	X	X

An X indicates a positive answer and a shaded box a negative answer.

Appendix B

Table B1 Itemized grid for classification of interview results

<i>Associated variables</i>	<i>Classification</i>
Sources of prior knowledge	Identification, recognized traceability of prior knowledge
Nature of external knowledge	Is it identified? (Yes/No)
Type of new knowledge	Can it be acted on? (Yes/No, short term, long term)
Prior investments	Yes/No
Prior experience	Yes/No
Acquisition of licenses	Yes/No
Contractual agreements	Yes/No
Alliances and other interrelationships or joint ventures	Yes/No
Motivations of people involved	Yes/No/Average
Organizational culture	Yes/No/In process of being established
Common and shared language	Yes/No/Being developed
Level of R&D	> 10% or not
Familiarity with organizational problems	Yes/No
Personnel turnover	Yes/No (Yes, if the cut-off figure is $\geq 20\%$)
Participation in decision-making	Yes/No
Capacity to detect opportunities in the environment (expectation formation)	Yes/No
Position of the firm in the network	Pivotal position or not
Routinization	Yes/No
Coordination capacity	Yes/No
Personnel turnover	Yes/No (Yes, if $\geq 15\%$)
Number of patents pending	Over previous 3 years
Number of research and/or practice communities	Number
Management support	Yes/No
Development of new products	Yes/No (annual figure)
Diversification	Yes/No
Routines for knowledge creation	Yes/No (Yes, if example can be given)
Number of new ideas	Yes/No (Yes, if number of ideas is \geq number of R&D employees)
Number of patents filed	Number
Number of new products	Number (shown as N=1, N=2, etc.)
Protection systems	Yes/No

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