

Dynamic Capabilities: Concept, Components and Outcomes

Jorge Cruz-González*, José E. Navas-López, Pedro López-Sáez, Miriam Delgado-Verde

Department of Business Administration. Universidad Complutense de Madrid, Spain.
jorge.cruz@ccee.ucm.es, jenavas@ccee.ucm.es, pedro.lopez@ccee.ucm.es,
miriamdv@ccee.ucm.es

Abstract

The dynamic capabilities perspective has recently come into the strategic management debate to overcome the limitations of the resource-based view in explaining sustainable competitive advantage in the face of continuous change. Nevertheless, dynamic capabilities concept and components suffers from certain terminological inconsistency in the literature, underscoring the initial state of this perspective. Accordingly, the aim of the present paper is to analyze the concept of dynamic capabilities in order to reconcile the different approaches that have been developed until now, and to identify the key components that enable firms to develop this special kind of capabilities. Based on literature review, we argue that dynamic capabilities arise from firm's orientation to knowledge exploration that enables the generation of new organizational capabilities, and we propose absorptive capacity and combinative capabilities as its key components.

Introduction

The dynamic capabilities perspective has emerged in the last decade to improve the explanatory power of both industrial economy and the resource-based view with regard to obtaining sustainable competitive advantage by firms facing rapid change environments (Teece, Pisano & Shuen, 1997; O'Reilly & Tushman, 2008). This new perspective in the strategic management field, with important implications for the management of innovation, considers the evolutionary nature of the resources and capabilities of the company in relation to the changes occurred in the environment in which it operates (Lavie, 2006).

According to the literature, the resource-based view of the firm presents some weaknesses. One of its main limitations is its static character. This is, resource-based view has not adequately explained how and why some firms exhibit timely responsiveness in unpredictable situations (Teece et al., 2007). This can be explained because external factors variation is not considered within the resource-based view model (Collins, 1994; Priem & Butler, 2001).

For this reason, more recently in the strategic management debate, the issues of volatile markets, environmental uncertainty and technological change have come to shift the emphasis on firms' ability to change and quickly develop new organizational capabilities as a critical prerequisite for sustaining competitive advantages (Zahra, Sapienza & Davidson, 2006).

Hence, the dynamic capabilities framework tries to link the arguments of those theories that explain the sustainable competitive advantage based on contextual factors, with those that attempt to explain the sustainability of competitive advantage from a purely internal perspective (Wernefelt, 1984; Barney, 1991).

Nevertheless, in spite of its relevance and the wide and increasing number of scientific studies focused on this phenomenon, the concept of dynamic capabilities suffers from certain terminological inconsistency (Zahra, et al., 2006). This fact underscores the initial state of the perspective. However, the lack of consensus with regard to the factors that influence the development of this kind of capabilities by firms is even more important (Wang & Ahmed, 2007).

In this sense, the aim of the present paper is twofold: (1) to analyze the concept of dynamic capabilities in order to reconcile the different perspectives that have been developed until now, and (2) to identify the key components that enable firms to develop this special kind of capabilities, or the subsets of capabilities in order to build them up.

Based on a comprehensive review of the literature, we classify the main theoretical contributions regarding dynamic capabilities in three broad approaches to this construct: the innovation approach, the contingent approach, and the capability-building approach. Although the definitions provided by each of these perspectives are quite different, we try to offer an integrative definition of dynamic capabilities that brings together all these three approaches.

The previous conceptual analysis suggests that generation of new firm capabilities lies at the heart of the concept of dynamic capabilities. According to several authors framed within the resource-based view and knowledge-based theory of the firm, capabilities are based on knowledge (Collins, 1994; Grant, 1996; Helfat & Peteraf, 2003). Therefore, the generation of new organizational capabilities requires the acquisition of new knowledge by firms or, in other words, that explorative learning take place (March, 1991; Van den Bosch, Volberda & de Boer, 1999; Danneels, 2002; 2008; Jansen, Van den Bosch & Volberda, 2006; O'Reilly & Tushman, 2008; Uotila, Maula, Keil & Zahra, 2009).

Taking into account the organization as level of analysis, the literature identifies two basic sources of new organizational knowledge. On the one hand, firms can conduct an explorative learning from the unexplored knowledge located inside of it (internal source). On the other hand, organizations can explore new knowledge located outside the firm boundaries (external knowledge) (Bierly & Chacrabarti, 1996; Zollo & Winter, 2002; Zahra & Nielsen, 2002; Lavie, 2006). Accordingly to the previous discussion, new capability generation requires both internal and external learning.

In this sense, we analyze the two main facets that, according to the literature, allow the firm to carry out explorative learning from internal and external sources. These are: (1) absorptive capacity, which allows the firm to recognize the value of new external knowledge, internalizing and applying it (Cohen & Levinthal, 1990; Jansen, Van den Bosch & Volberda, 2005); and (2) combinative capabilities, devoted to combining the existing knowledge with novelty and flexibly for generating new organizational knowledge (Kogut & Zander, 1992; Van den Bosch et al., 1999). By analyzing both factors, this paper highlights some of the main mechanisms that allow the firm to acquire new organizational knowledge from external sources and to generate it through current knowledge combination.

Our theoretical review and analysis leads us to propose a research model of dynamic capabilities which includes its components and the role of environmental dynamism as moderator of the relation between new capabilities generation and firm's competitive advantage. Finally, some interesting future research directions emerging from our theoretical analysis are discussed.

Dynamic Capabilities Concept

Based on literature review, we have identified a lack of consensus about dynamic capabilities definition. For this reason, this paper has tried to order the major definitions adopted by the main authors framed within this perspective. As a result, we have identified three differentiated approaches: innovation, contingent and capability-building.

Based on a Schumpeterian reasoning, the research body classified into innovation approach tends to define dynamic capabilities as firm's ability to innovate in products or services, processes or business models. This approach recognizes innovation as primary means to achieve the necessary organizational renewal for firm's adaptation and survival in the current business environment, characterized by growing changes in technology, customers and competitors (Danneels, 2002).

The second approach, this is, the capability-building approach, is rooted both in the resource-based view (Wernefelt, 1984; Barney, 1991) and evolutionary economics (Nelson & Winter, 1982). According with the resource-based view, organizational capabilities may lead the firm to achieve a competitive advantage at present. Nevertheless, under an evolutionary perspective, current attributes do not guarantee a firm's future viability (O'Reilly & Tushman, 2008). A competitive advantage based in the same capabilities is not sustainable during a long period of time because organizational capabilities may be eroded by external changes, such as new actions carried out by competitors (Collins, 1994; Helfat & Peteraf, 2003; Sirmon, Hitt & Ireland, 2007). Hence, the capability-building approach understands dynamic capabilities as those that enable the generation of new organizational capabilities (meta-capabilities or second-order capabilities), allowing the firm to sustain its competitive advantage (Collins, 1994; Danneels, 2008). "These capabilities might include the flexibility to shift between capabilities more efficiently or faster than competitors (...), or the ability to respond to or initiate radical change" (Collins, 1994: 148).

Finally, the third perspective is rooted in the contingency theory. Under this approach, dynamic capabilities are defined in terms of fit with firm's environmental conditions. In this sense, four scenarios can be identified: beneficial strategic change (fit), insufficient strategic change (misfit), excessive change (misfit), and beneficial inertia (fit) (Zajac et al., 2000: 433). Dynamic capabilities are classified in the first scenario, this is, when firm's environment requires a strategic change and firm effectively change as needed, resulting in a higher performance. Hence, authors classified under this perspective consider that firm's dynamic capabilities follow a schema such as external signals-interpretation-response.

After a careful analysis of the major definitions found in the literature, we reach the same conclusion than Zahra et al. (2006): broadly, dynamic capabilities definitions are tautological. In this sense, the three mentioned approaches define dynamic capabilities based on its results: innovation, new capabilities generation, and fit with external conditions, respectively. This tautological problem can also be found in the resource-based view literature (Priem & Butler, 2001).

We do not argue that dynamic capabilities do not lead to these results. Nevertheless, we argue that a concept, in this case dynamic capabilities, cannot be described based on its output. If we do this, dynamic capabilities will be conceived as a black box (Sirmon et al., 2007). In this sense, some of the cited authors have devoted considerably efforts trying to overcome this problem. For example, Helfat & Peteraf (2003) argue that dynamic capabilities are oriented to the generation, integration, or reconfiguration of firm's resources and capabilities. Similarly, Zahra et al. (2006) consider that dynamic capabilities consist in new reconfiguration of firm's resources and routines. In the same way, Teece (2007) includes in his dynamic capabilities definition the processes of shape, reshape, configure and reconfigure of the firm's asset base. Another valuable example is provided by Wang & Ahmed (2007) when they argue that dynamic capabilities consist in firm's behavioural orientation constantly to integrate, reconfigure, renew and recreate its resources and capabilities. Note that all these contributions could be classified into the capability-building approach.

Once this rider has been added, our review has pointed out that the capability-building approach is the perspective that encompasses more authors. One explanation provided by the literature is that new capabilities generation is required both for innovation as well as for adaptation to environmental turbulence (Henderson & Cockburn, 1994; Zahra & George, 2002; Dannels, 2002, 2008; Jansen et al., 2006; Lavie, 2006; O'Reilly & Tushman, 2008). Accordingly, we argue that, although different, the three approaches identified are not incompatible. Hence, new capabilities generation (capability-building approach) may allow the firm to innovate in products, processes or business models (innovation approach), enabling it to be adapted to a turbulent environment (contingent approach). Therefore, new organizational capabilities have to be considered as the direct output of dynamic capabilities. If a firm develops new technological capabilities, it may improve its ability to produce better products, new products, or the same products at a lower cost. Similarly, if a firm develops new market capabilities, it may better serve its current customers, or to serve a new market segment (Danneels, 2008). These new technological and market capabilities are essential for firm survival in the face of changes affecting technology or customers' demand patterns (Lavie, 2006; Sirmon et al., 2007). So, we consider the capability-building approach as the central perspective in the academic literature focused on a dynamic capabilities view of competitive advantage.

The Role of Environmental Dynamism

Another question emerging from the analysis of dynamic capabilities concept is the consideration of external factors as key element in this perspective. We have noted how most authors include environmental conditions as a fundamental factor of their dynamic capabilities definition. Furthermore, the tendency to consider environmental dynamism increases in the most recent works. This can be explained because a growing body of literature argues that the value of firm resources and capabilities is context-dependent (Collins, 1994; Teece et al., 1997; Priem & Butler, 2001; Barney, 2001; Helfat & Peteraf, 2003; Benner & Tushman, 2003; Jansen et al., 2006; Lavie, 2006; Sirmon et al., 2007).

Under this reasoning, firm's current technological and market capabilities, while valuable if they can provide competitive advantage at present, do not ensure that the firm would be able to change in the face of a new threat (O'Reilly & Tushman, 2008). In this sense, rapid technological advances may cause obsolescence in firm's current technological capabilities, since the new technology will enable new product innovation, improve the

existing ones, or to produce at lower cost (Lavie, 2006; Danneels, 2008; Uotila et al., 2009). Similarly, changes in demand patterns of customers may negatively affect the firm's ability to serve a particular group of customers, reducing the value of its current market capabilities (Danneels, 2008). Hence, under the dynamics of Schumpeterian external regimes, competitive advantage sustainability lies in firm's ability to continually reconfigure its capabilities base (Teece et al, 1997; Danneels, 2002, 2008; Helfat & Peteraf, 2003; Lavie, 2006).

Since organizational capabilities are based on idiosyncratic collective knowledge (Collins, 1994; Grant, 1996; Helfat & Peteraf, 2003), firm's survival in the face of external turbulence lies in its ability to accomplish an explorative learning that expands its current knowledge base, allowing the organizational capabilities regeneration (March, 1991; Danneels, 2008; O'Reilly & Tushman, 2008; Uotila et al. 2009)

Based on the previous discussion, we define dynamic capabilities as firm's ability to constantly explore new market and technological knowledge in order to build new organizational capabilities. This ability is especially valuable in the face of rapid changes in markets and/or technologies. Thus, the greater the environmental dynamism, the greater should be the ability of the firm to engage in explorative learning that enables capability reconfiguration.

Dynamic Capabilities Main Components

But, where can firms find new knowledge that enables firm's capability reconfiguration? Literature argues that, at organizational level, there are two basic sources of new knowledge: internal and external sources.

According to Bierly & Chakrabarti, "internal learning occurs when members of the organization generate and distribute new knowledge within the boundaries of the firm", while "external learning occurs when boundary spanners bring in knowledge from an outside source via either acquisition or imitation and the knowledge is then transferred through the organization" (1996: 124). Internal learning allows the firm to improve its current capabilities (knowledge exploitation), whereas external learning is required to develop a broader knowledge base (knowledge exploration), becoming critical in dynamic environments. In this sense, Lavie (2006) carries out an interesting review of the method for capability reconfiguration through three main mechanisms: capability evolution, substitution and transformation. Based on evolutionary economics, capability evolution involves incremental learning through experimentation from internal sources of knowledge. Capability substitution is rooted in the competence-enhancing/destroying framework and involves radical learning from external sources, such as industry associations, alliance partners, newly acquired subsidiaries, and newly hired employees. Finally, capability transformation is an intermediate mechanism for firm capabilities reconfiguration that combines internal and external learning.

Nevertheless, Several authors argue that not only external knowledge, but also internal knowledge sources are important for developing a successful explorative learning process (Henderson & Cockburn, 1994; Zahra, 1999; Zollo & Winter, 2002; Jansen et al., 2006; Sirmon et al., 2007; Danneels, 2008) and, hence, for survival in dynamic environments.

Attending to its definition, "exploration is search for new knowledge, use of unfamiliar technologies, and creation of products with unknown demand" (Greve, 2007: 945), so "the essence of exploration is experimentation with new alternatives" (March, 1991: 85).

This process should not be based only on external sources, but also on the firm's uncharted internal knowledge. Following Grant (1996), "the essence of organizational capability is the integration of individuals' specialized knowledge" (1996: 375). Thus, according to Kogut & Zander (1992), new capabilities creation relies on firm's ability to generate new applications for existing knowledge and to discover the unexplored knowledge located inside the firm, so, internal learning may be also explorative when it promotes new combinations of current knowledge (Van den Bosch et al., 1999; Jansen et al., 2006; Danneels, 2008). A firm's ability to novelty recombine and utilize its current knowledge base is what Kogut & Zander (1992) define as combinative capabilities. This internal knowledge combination enhances knowledge exchange between individuals and disciplinary boundaries and generates new organizational knowledge (Van den Bosch et al., 1999; Henderson & Cockburn, 1994; Jansen et al., 2006)

One valuable example of literature supporting the argument that internal knowledge sources are relevant for explorative learning is provided by Henderson & Cockburn (1994). These authors argue that there are two forms of 'integrative' or 'architectural competences' especially relevant as sources of sustainable competitive advantage in a dynamic context, as pharmaceutical research is. These are "the ability to access new knowledge from outside the boundaries of the organization and the ability to integrate knowledge flexibly across disciplinary (...) boundaries within the organization" (Henderson & Cockburn, 1994: 66).

In the same way, Zahra (1999) argues that there are two key ways to build and sustain dynamic capabilities. One way is to harvest the wellspring of creativity and knowledge among firm's employees (promoting internal learning). Another mode to build dynamic capabilities is to use external sources of organizational capabilities to complement and augment the firm's current skills (promoting external learning).

Therefore, it seems that firms can develop its ability to build new capabilities through explorative learning by investing in a special kind of internal learning based on its current knowledge combination, and by creating linkages to external knowledge sources. Both learning mechanisms are presented below.

External knowledge acquisition

Firms need continually acquire diverse and new knowledge that serve as the seed for future technological and market developments (Miller, Fern & Cardinal, 2007; Escribano et al., 2009). It is not possible to carry out explorative learning only based on firm's current knowledge combination (Sirmon, et al., 2007) because not all knowledge can be effectively generated or embodied solely within the firm (Bierly, Damanpour & Santoro, 2009).

External knowledge acquisition has been studied in the field of absorptive capacity literature. In their seminal paper, Cohen & Levinthal define absorptive capacity as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends" (1990: 128). This ability to scan and acquire new external knowledge is critical for firm adaptation and survival in dynamic environments (Van den Bosch et al., 1999; Jansen et al., 2005; Lavie, 2006; Sirmon, et al., 2007). In this sense, Zahra & George conceive absorptive capacity as "a dynamic capability that influences the firm's ability to create and deploy the knowledge necessary to build other organizational capabilities" (2002: 188). These authors argue that absorptive capacity is especially important for firm adaptation to environmental dynamism because it makes the organization receptive to acquire and assimilate new external knowledge.

This external learning expands the firm's knowledge base, enhances the recognition of opportunities and threats, and provides access to new ideas that promote the generation of new market and technological capabilities (Miller et al., 2007; Danneels, 2008). For example, scientific journals may be a source of great deal of publicly available knowledge for R&D employees (Escribano et al., 2009). Similarly, collaborations with universities and research centres may enable the firm to access more rapidly and at a lower cost to new technological capabilities necessary for new product development (Bierly et al, 2009). Likewise, participation in professional association's activities may lead the firm to have access to new trends in the market, providing some clues about the future evolution of the industry (Danneels, 2008). In addition, organizational gatekeepers may enable to take new initiatives to react faster to changing market conditions and possibly make higher quality decisions because they are closer to the relevant information (Andersen, 2004). Table 1 presents the mechanisms that enable external knowledge acquisition by organizations identified in the literature.

External knowledge acquisition affects firm's ability to earn economic rents, especially in dynamic environments. But, according to the theory on strategic networks, linkages with many network partners may increase the breadth and variety of information to which an organization has access, while strong linkages to one or few network partners may unproductively limit an organization's vision of alternatives (Murovec & Prodan, 2009).

Nevertheless, it is necessary to consider that new external knowledge needs to be complementary to firm's current knowledge base to be fully understood by the firm (Cohen & Levinthal, 1990; Zahra & George, 2002; Miller et a., 2007). This leads to the *local versus distant search of knowledge* debate (Miller et al., 2007 for an in depth discussion about this topic).

Table 1. Mechanisms for external knowledge acquisition.

Mechanism	Author
Mergers and acquisitions	Kogut & Zander (1992); Zahra & George (2002); Lavie (2006)
Alliances and cooperation agreements	Kogut & Zander (1992); Zahra (1999); Zahra & Nielsen (2002); Zahra & George (2002); Lavie (2006); Danneels (2008)
Information exchanges with customers and suppliers	Jansen et al. (2005); Galende (2006); Teece (2007); Arbussà & Coenders (2007); Escribano et al. (2009); Murovec & Prodan (2009)
Information exchanges with competitors and complementary	Galende (2006); Teece (2007); Escribano et al. (2009); Murovec & Prodan (2009)
Benchmarking activities	Helfat & Raubitschek (2000); Teece (2007)
Reverse engineering	Kogut & Zander (1992); Galende (2006)
People, teams or organizational units specifically devoted to capture external knowledge (<i>gatekeepers</i>)	Cohen & Levinthal (1990); Helfat & Raubitschek (2000)
Relations with universities and research centres	Henderson & Cockburn (1994); Galende (2006); Arbussà & Coenders (2007); Danneels (2008); Bierly et al (2009); Escribano et al. (2009); Bierly et al. (2009); Murovec & Prodan (2009)
Outsourcing and licensing	Zahra (1999); Zahra & Nielsen (2002); Zahra & George (2002)
External personnel recruitment	Kogut & Zander (1992); Zahra & Nielsen (2002); Figueiredo (2003); Lavie (2006)
Active use of technical assistance and consultants	Zahra & Nielsen (2002); Figueiredo (2003); Jansen et al. (2005); Murovec & Prodan (2009)
Participation in professional associations'	Lavie (2006); Arbussà & Coenders (2007); Danneels

activities	(2008); Escribano et al. (2009)
Attendance and/or participation in congresses, conferences, exhibitions and fairs	Arbussà & Coenders (2007); Danneels (2008); Murovec & Prodan (2009)
Scientific and professional journals	Arbussà & Coenders (2007); Danneels (2008); Escribano et al. (2009)
External R&D	Cohen & Levinthal (1990); Murovec & Prodan (2009)

Internal knowledge combination

As it has been discussed, although necessary, external knowledge acquisition per se is not enough to achieve firm's adaptation to dynamic environments. In addition, firms need to develop their ability to novelty recombine and utilize its current and acquired knowledge base (Kogut & Zander, 1992; Grant, 1996; Sirmon et al., 2007).

Several definitions have been used by researchers to refer to this ability: internal transference (Cohen & Levinthal, 1990), combination (Kogut & Zander, 1992), integration (Grant, 1996), coordination (Van den Bosch et al., 1999; Jansen et al., 2005) or transformation (Lane, Koka & Pathak, 2006). Nevertheless, and according with the previous discussion, we consider that the term combination is the most appropriate to refer the process described above.

In this sense, organizational recovery requires recombining firm's internal resources (as knowledge). This internal organizational knowledge combination is what Kogut & Zander (1992) defined in their seminal paper as combinative capabilities. As Lane et al. point out, "what creates competitive advantage out of knowledge is the unique and valuable ways in which it is combined and applied" (2006: 854). The development of the capabilities that allow internal knowledge combination is path dependent (Van den Bosch et al., 1999; Jansen et al., 2005) and is usually embedded in firm's culture and the trust that prevails among its units, groups and employees (Zahra & Nielsen, 2002).

We associate the notion of combination with "coordination capabilities" used by Van den Bosch et al. (1999). According to these authors, coordination capabilities refer to lateral ways of coordination that enhance the scope and flexibility of organizational learning through relations between its members and groups. This kind of capabilities can be developed as a result of training and job rotation, cross-functional interfaces and participation of subordinates in the decision-making process (Van den Bosch et al., 1999; Jansen et al., 2005). Thus, internal knowledge combination enhances knowledge exchange between different individuals and groups within the firm (Jansen et al, 2005) and, thus, encourages the development of new knowledge (Sirmon et al., 2007). As Zollo & Winter highlights, "important collective learning happens when individuals express their opinions and beliefs, engage in constructive confrontations and challenge each other's viewpoints" (2002: 341). This constructive conflict refers to the vigorous debate of ideas, beliefs, and assumptions by organizational members that enable the discussion of opposite views, leading to make better decisions and to develop new organizational capabilities (Danneels, 2008).

Table 2. Mechanisms for internal knowledge combination.

Mechanism	Author
Internal R&D	Arbussà & Coenders (2007); Murovec & Prodan (2009)
R&D Intensity	Cohen & Levinthal (1990); Bierly & Chakrabarti (1996); □ Arbussà & Coenders (2007)
Cross-functional and inter-disciplinary teams	Cohen & Levinthal (1990); Henderson & Cockburn

	(1994); Zahra & Nielsen (2002); Jansen et al. (2005); Leskovar-Spacapan & Bastic (2007)
Shared spaces	Figueiredo (2003)
Shared-problem solving	Zahra & Nielsen (2002); Figueiredo (2003); Leskovar-Spacapan & Bastic (2007); Danneels, (2008)
Regular meetings to discuss new market and technology trends	Zahra & Nielsen (2002); Figueiredo (2003); Jansen et al. (2006)
Participation in decision-making	Van den Bosch et al. (1999); Andersen (2004); Jansen et al. (2005)
Tolerance to failure	Leskovar-Spacapan & Bastic (2007); Danneels (2008)
Organizational structure that promotes flexible information flow	Van den Bosch et al. (1999); Zahra & Nielsen (2002); Leskovar-Spacapan & Bastic (2007)
Promotion of informal relationships	Van den Bosch et al. (1999); Zahra & Nielsen (2002); Jansen et al. (2006)
Job rotation	Cohen & Levinthal (1990); Van den Bosch et al. (1999); Jansen et al. (2005) Figueiredo (2003)
Flexible job descriptions	Van den Bosch et al. (1999); Leskovar-Spacapan & Bastic (2007)
Firm's investments in training	Van den Bosch et al. (1999); Zahra (1999); Murovec & Prodan (2009)

R&D intensity of a firm has been traditionally used as a primary input variable to internal learning (Bierly & Chakravarty, 1996). In this sense, internal R&D is a way to put together the knowledge possessed by the firm's scientific staff. Although Cohen & Levinthal (1990) used this variable as a proxy of firm's absorptive capacity, they were based on their argument that firms need some previous related knowledge to assimilate new external information. Another example of internal knowledge combination is the use of cross-functional interfaces. This practice support organizational members in rethinking the nature of existing products and services and revisit the ways in which components are integrated or the market is currently being served (Henderson & Cockburn, 1994; Jansen et al., 2005). Similarly, participation in decision-making promotes more market views and organizational perspectives to be considered in strategic decisions, which should lead to better decision outcomes (Andersen, 2004). In the same way, job rotation of employees who each possesses diverse and varied knowledge enhances the diversity of background, increases the problem-solving skills and develops organizational contacts that may increases employees' ability to identify opportunities (Jansen et al., 2005). Table 2 shows the mechanism for internal knowledge combination identified in the literature.

A Proposed Model of Dynamic Capabilities

In the present paper we have highlighted that the direct outcome of dynamic capabilities is new organizational market and technological capabilities. This argument synthesizes the reasoning provided by the capability-building approach. Accordingly, these new capabilities may enable the firm to develop product and process innovations and/or to serve new customers. Since organizational capabilities are based on knowledge, new capabilities generation requires a firm's orientation through continuous knowledge exploration (Sirmon et al., 2007; Danneels, 2008). As it has been argued, organizational explorative learning is based both on external knowledge acquisition and internal knowledge combination. Therefore, we propose the following.

Proposition 1: Dynamic capabilities (external knowledge acquisition and internal knowledge combination) generate new organizational capabilities (market and technological).

According to the resource-based view, competitive advantage relies on the resources and capabilities possessed and managed by the firm (Wernefelt, 1984; Barney, 1991), especially on intangible or knowledge resources that configure firm capabilities (Collins, 1994; Grant, 1996). In this sense, technological capabilities define the firm ability to make certain physical products in a certain way and at a certain cost, whereas market capabilities enable the firm to serve certain customers (Danneels, 2002; 2008). Hence, new capabilities developed by the firm, as the older ones did in the past, will determine its ability to earn economic rents (Henderson & Cockburn, 1994; O'Reilly & Tushman, 2008). Accordingly, we derive our second proposition.

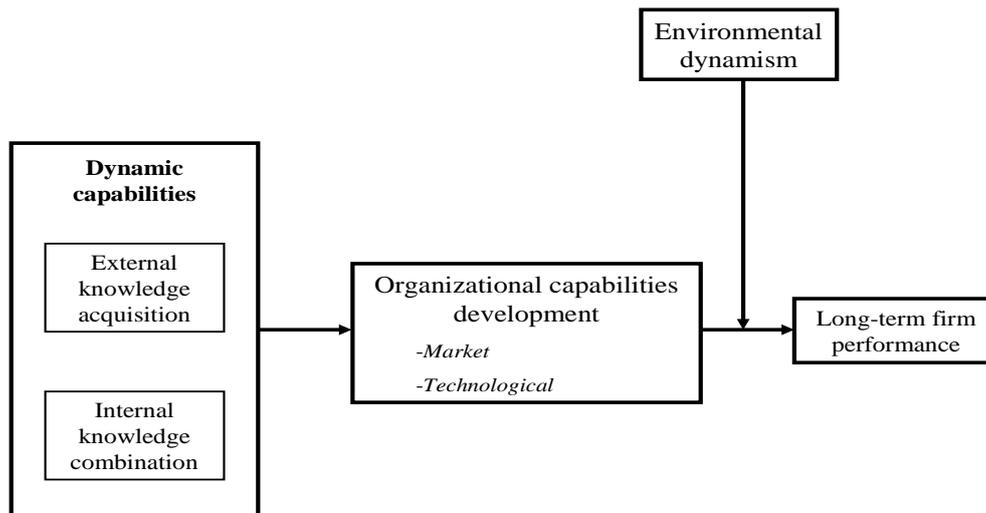
Proposition 2: New organizational capabilities (market and technological) development determines long-term firm performance.

Note that these arguments could lead to the tautological problem discussed when analyzing the main definitions of dynamic capabilities provided by the literature. In order to avoid this flaw, we have argued that the value of firm's resources and capabilities, this is, its potential to generate economic rents, is context-dependent (Priem & Butler, 2001; Barney, 2001; Benner & Tushman, 2003; Jansen et al., 2006; Sirmon et al., 2007). In this sense, advances in technology or changes in demands patterns of customers may make existing capabilities obsolete (Benner & Tushman, 2003; Lavie, 2006; Danneels, 2002; 2008; Uotila et al., 2009). Hence, when a firm operates in a dynamic environment, the competitive advantage lies in its ability to reconfigure its capabilities base (Teece et al, 1997; Danneels, 2002, 2008; Lavie, 2006), and this reasoning makes necessary to include environmental conditions in several dynamic capabilities' definition.

Proposition 3: Environmental dynamism positively moderates the relationship between new organizational capabilities (market and technological) development and long-term firm performance.

Figure 1 summarizes the arguments presented along this paper by offering a model of dynamic capabilities which includes the two main components discussed above, the generation of new market and technological capabilities as direct output of dynamic capabilities and the influence of external conditions in the relationship between new organizational capabilities and long-term firm performance.

Figure 1. Dynamic capabilities' main components and outcomes



Future Research Directions

The first research challenge emerging from our theoretical analysis consists in carry out empirical tests. Most of the empirical studies in the field of dynamic capabilities are qualitative (Wang & Ahmed, 2007). This fact, again, underscores the initial state of the perspective. Our work has highlighted some measures and possible scales for operationalizing dynamic capabilities based on internal organizational process which may be very useful for researchers interested in this field.

In this sense, we highlight the interest of conducting quantitative studies that analyze the relationship between the use of mechanisms for external knowledge acquisition and internal knowledge combination by firms for different types of innovation. Specifically, it can be expected that the use of both explorative learning mechanisms will have a positive impact on both radical and product innovation, but empirical findings could be different. As literature points out, something more than just incremental improvements is critical for firm renewal and survival in dynamic environments (Danneels, 2002; Jansen et al., 2006; Escribano et al., 2009), while it can be enough in the face of more stable competitive landscapes.

In addition to innovation, it may be interesting to empirically address the link between the two explorative learning mechanisms proposed and other elements of firm's strategy, such as diversification, changes in competitive strategy or higher levels of internationalization, among others. All of these strategic decisions should require new knowledge on markets and technology to be successful and dynamic capabilities may lead to changes not only in the resource and capabilities base, but also in the way that they are managed and in where they are employed.

Another interesting research direction is to investigate if some mechanisms for external knowledge acquisition may be more adequate than others depending on the industry. In this sense, it seems that collaborations with universities and research centres is highly important in experimental sciences sectors, such as pharmaceutical industry (Hnederson & Cockburn, 1994), whereas in the automobile industry it could be more important to develop collaborations with suppliers. Similarly, different competitive sectors may demand different

mechanisms for internal knowledge combination. Just few recent studies have tried to fill this gap, and have focused exclusively in some mechanism for external knowledge acquisitions, such as collaboration with universities (Bierly et al., 2009).

In addition, the moderating role of environmental dynamism also needs to be tested. If our proposition that predicts a greater effect of both explorative learning mechanisms on firm performance is supported, important managerial implications will be derived. In this sense, managers should overcome their risk-taking aversion and try to increase their emphasis on exploration when the environment requires it. Again, empirical research about exploration of new knowledge and environmental dynamism is very scarce (Jansen et al., 2006; Danneels, 2008, Uotila et al., 2009).

References

- Andersen, TB (2004). Integrating Decentralized Strategy Making and Strategic Planning Processes in Dynamic Environments. *Journal of Management Studies*, 28(8), 1271-1299.
- Arbussá, A and Coenders, G (2007). Innovation Activities, Use of Appropriation Instruments and Absorptive Capacity: Evidence from Spanish Firms. *Research Policy*, 36(10), 1545-1558.
- Barney, JB (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99-120.
- Barney, JB (2001). Is the Resource-Based “View” a Useful Perspective for Strategic Management Research? Yes. *Academy of Management Review*, 26(1), 41-56.
- Benner, MJ and Tushman, ML (2003). Exploitation, Exploration, and Process Management: The Productivity Dilemma Revisited. *Academy of Management Review*, 28(2), 238-256.
- Bierly, P and Chakrabarti, A (1996). Generic Knowledge Strategies in the U.S. Pharmaceutical Industry. *Strategic Management Journal*, 17(Winter Special Issue), 123-135.
- Bierly, PE, Damanpour, F and Santoro, MD (2009). The Application of External Knowledge: Organizational Conditions for Exploration and Exploitation. *Journal of Management Studies*, 46(3), 481-509.
- Cohen, WM and Levinthal, DA (1990). Absorptive Capacity: A New Perspective of Learning and Innovation. *Administrative Science Quarterly*, 35(1), 128-152.
- Collins, DJ (1994). Research Note: How Valuable are Organizational Capabilities? *Strategic Management Journal*, 15(Winter Special Issue), 143-152.
- Danneels, E (2002). The Dynamics of Product Innovation and Firm Competences. *Strategic Management Journal*, 23(12), 1095-1121.
- Danneels, E (2008). Organizational Antecedents of Second-Order Competences. *Strategic Management Journal*, 29(5), 519-543.
- Escribano, A, Fosfuri, A and Tribó, JA (2009). Managing External Knowledge Flows: The Moderating Role of Absorptive Capacity. *Research Policy*, 38(1), 96-105.
- Figueiredo, PN (2003). Learning, Capability Accumulation and Firm Differences: Evidence from Latecomer Steel. *Industrial and Corporate Change*, 12(3), 607-643.
- Galende, J (2006). Analysis of Technological Innovation from Business Economics and Management. *Technovation*, 26(3), 300-311.
- Grant, RM (1996). Prospering in Dynamically-Competitive Environments: Organizational Capability as Knowledge Integration. *Organization Science*, 7(4), 375-387.
- Greve, HR (2007). Exploration and Exploitation in Product Innovation. *Industrial and Corporate Change*, 16(5), 945-975.

- Helfat, CE and Raubitschek, RS (2000). Product Sequencing: Co-Evolution of Knowledge, Capabilities and Products. *Strategic Management Journal*, 21(10/11), 961-979.
- Helfat, CE and Peteraf, MA (2003). The Dynamic Resource-Based View: Capability Lifecycles. *Strategic Management Journal*, 24(10), 997-1010.
- Henderson, R and Cockburn, I (1994). Measuring Competence? Exploring Firm Effects in Pharmaceutical Research. *Strategic Management Journal*, 15(Winter Special Issue), 63-84.
- Jansen, JJP; Van den Bosch, FAJ and Volberda, HW (2005). Managing Potential and Realized Absorptive Capacity: How Do Organizational Antecedents Matter? *Academy of Management Journal*, 48(6), 999-1015.
- Jansen, JJP; Van den Bosch, FAJ and Volberda, HW (2006). Exploratory Innovation, Exploitative Innovation, and Performance: Effects of Organizational Antecedents and Environmental Moderators. *Management Science*, 52(11), 1661-1674.
- Kogut, B and Zander, U (1992). Knowledge of the Firm, Combinative Capabilities, and the Replication of Technology. *Organization Science*, 3(3), 383-397.
- Lane, PJ, Koka, BR and Pathak, S (2006). The Reification of Absorptive Capacity: A Critical Review and Rejuvenation of the Construct. *Academy of Management Review*, 31(4), 833-863.
- Lavie, D (2006). Capability Reconfiguration: An Analysis of Incumbent Responses to Technological Change. *Academy of Management Review*, 31(1), 153-174.
- Leskovar-Spacapan, G and Bastic, M (2007). Differences in Innovation Capability in Transition Economy: Internal Aspect of the Organization's Strategic Orientation. *Technovation*, 27(9), 533-546.
- March, JG (1991). Exploration and Exploitation in Organizational Learning. *Organization Science*, 2(1), 71-87.
- Miller, DJ; Fern, MJ and Cardinal, RB (2007). The use of Knowledge for Technological Innovation within Diversified Firms. *Academy of Management Journal*, 50(2), 308-326.
- Murovec, N and Prodan, I (2009). Absorptive Capacity, its Determinants and Influence on Innovation Output: Cross-Cultural Validation of the Structural Model, *Technovation*, 29 (12), 859-872.
- Nelson, RR and Winter, SG (1982). *An Evolutionary Theory of Economic Change*. Cambridge, USA: Belknap Press of Harvard University Press.
- O'Reilly III, CA & Tushman, ML (2008). Ambidexterity as a Dynamic Capability: Resolving the Innovator's Dilemma. *Research in Organizational Behaviour*, 28, 185-206.
- Priem, RL and Butler, JE (2001). Is the Resource-based 'View' a Useful Perspective for Strategic Management Research? *Academy of Management Review*, 26(1), 22-40.
- Sirmon, DG; Hitt, MA and Ireland, RD (2007). Managing Firm Resources in Dynamic Environments to Create Value: Looking Inside the Black Box. *Academy of Management Review*, 32(1), 273-292.
- Teece, DJ; Pisano, G and Shuen, A (1997). Dynamic Capabilities and Strategic Management. *Strategic Management Journal*, 18(7), 509-533.
- Teece, DJ (2007). Explicating Dynamic Capabilities. The Nature and Microfoundations of (Sustainable) Enterprise Performance. *Strategic Management Journal*, 28(13) 1319-1350.
- Uotila, J; Maula, M; Keil, T and Zahra, SA (2009). Exploration, Exploitation, and Financial Performance: Analysis of S&P 500 Corporations. *Strategic Management Journal*, 30(2), 221-231.
- 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.

- Wang, CL and Ahmed, PK (2007). Dynamic Capabilities: A Review and Research Agenda. *International Journal of Management Reviews*, 9(1), 31-51.
- Wernefelt, B (1984). A Resource-based View of the Firm. *Strategic Management Journal*, 5(2), 171-180.
- Zahra, SA (1999). The Changing Rules of Global Competitiveness in the 21st Century. *Academy of Management Executive*, 13(1), 36-42.
- Zahra, SA and George, G (2002). Absorptive Capacity: A Review, Reconceptualization, and Extension. *Academy of Management Review*, 27(2), 185-203.
- Zahra, SA and Nielsen, AP (2002). Sources of Capabilities, Integration and Technology Commercialization. *Strategic Management Journal*, 23(5), 377-398.
- Zahra, SA; Sapienza, HJ and Davidsson, P (2006). Entrepreneurship and Dynamic Capabilities: A Review, Model and Research Agenda. *Journal of Management Studies*, 43(4), 917-955.
- Zajac, EJ; Kraatz, MS and Bresser, RFK (2000). Modeling the Dynamics of Strategic Fit: A Normative Approach to Strategic Change. *Strategic Management Journal*, 21(4), 429-453.
- Zollo, M and Winter, S.G (2002). Deliberate Learning and the Evolution of Dynamic Capabilities. *Organization Science*, 13(3), 339-351.