

DYNAMIC CAPABILITIES: A STILL UNEXPLORED ISSUE WITH GROWING COMPLEXITY

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Abstract

The aim of the paper is to carry out a literature review of studies on dynamic capabilities in order to find possible gaps that symbolize the current confusion around this research stream.

The paper draws a systematic literature review methodology to answer the research questions through an overview of current debate on dynamic capabilities and knowledge-based dynamic capabilities. This methodology puts in evidence that there are still unresolved theoretical aspects due to the lack of empirical works. Indeed, this research aims to make a contribution to the current literature on dynamic capabilities, trying to cover the existing gaps and directing the further research efforts.

This paper has a significant implication for the understanding of value creation process.

Keywords: Value Creation, Dynamic Capabilities, Knowledge-Based Dynamic Capabilities, Process Level Performance, Firm Level Performance

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1 Introduction

In today's global context, firm's competitive surrounding changes rapidly through processes of both internal and external innovation. In order to quickly respond, anticipate or even provoke changes in the global competitive set, firms must dynamically and rapidly use their resource configuration in reconfiguring, adapting and recreating internal and external resources (Teece et al, 1997; Winter, 2003; Teece, 2007). The concept of dynamic capabilities (DC) provides an integrative approach to the Resource-based Theory (RBT - Penrose, 1959; Barney; 1991, Grant, 1991; Peteraf, 1993; Wernerfelt, 1984) since it explains how firm can exploit/explore and even generate entrepreneurial opportunities in a volatile and hypercompetitive environment (D'Aveni, 1994).

Therefore, this paper attempts to explore the role of dynamic capabilities (DC) in the light of firm value creation. This concept recalls firm's competitiveness not only in terms of financial performance but also with regard to its main stakeholders, both internal and external. In this direction, Ambrosini and Bowman (2009) argue that "dynamic capabilities impact firm value creation via their impact on the resource base".

Indeed, the dynamic capabilities perspective suggests that to gain and sustain competitive advantage, firms must continually reconfigure their resources in new assets. Such view explains why it is important to understand the micro-level origins to

dynamic capabilities that are able to lead to competitive advantage (Easterby-Smith *et al.*, 2009).

Furthermore, although many contributions have been developed since the first academic article appeared (Teece *et al.*, 1994), Easterby-Smith *et al.* (2009), it is necessary to underline that the "dynamic capabilities are difficult to measure empirically". This represents a critical node in the development of the topic since it makes it difficult to understand the real and effective role of dynamic capabilities.

2 Research questions

This paper deeps its roots in the analysis of resource-based theory (RBT) development in its new connected approaches and paradigms, that are more focused on specific aspects, such as knowledge, rather than relations or dynamic processes. In particular, the objective is to study the roots and the contents of the so called "dynamic capabilities".

Based on the set of issues analyzed in the dynamic capabilities literature, some interesting gaps come out through the exploration of the following research questions:

- 1) What are the origins of the dynamic capabilities approach?
- 2) What is the meaning of the term "dynamic"?
- 3) How do dynamic capabilities leverage firm's resource base?
- 4) What are the antecedents to dynamic capabilities? Are there different levels of analysis?

- 5) How do dynamic capabilities generate a sustainable competitive advantage? Or better, what is the dynamic capabilities' (DC) contribution to firm's performance?
- 6) What is the role of knowledge-based dynamic capabilities in value creation?

A systematic approach to dynamic capabilities literature review allows identifying some research gaps to highlight the future steps in the study of the DC.

Although this research topic seems to be exhaustively analyzed, there are still contradictory contributions. Furthermore, the lack of a common framework and the weak of empirical development still impede a clear understanding of the issue.

3 Methodology

This paper undertakes a literature review methodology as it "provides a historical perspective of the respective research area" (Mentzer and Kahn, 1995).

Within the studies in strategic management, the different paradigms try to answer to never ending dilemmas, like competitive advantage and the theory of the firm. The reason why these topics are continuously analyzed is that they try to explore why firms exist and what for. Of course, each of the above mentioned issues (capabilities rather than firm boundaries) reflects the continuously changing sets of firms and markets, getting to more and fuzzier definitions and conclusions. Moreover, in this confusing set, it is interesting to study how contributions in the literature try to explore and analyze firm's strategies and consequent organizational behaviours.

One of the above underlined research questions is how dynamic capabilities can generate sustainable competitive advantage, through the development of new resources and/or the leveraging of already existing resources. The starting point is that literature on the topic is still unexhaustive. Therefore, a systematic literature review is required in order to identify the current gaps and to address further research.

The literature search has been extended via bibliographic electronic databases, such as Emerald, Direct (Elsevier) and Business Source Premier (EBSCO), crossing the resulting lists. The research has used the following criteria:

- 1) keywords search "value creation", "rent creation", "dynamic capabilities"; "knowledge-based dynamic capabilities";
- 2) analyzing both theoretical and empirical studies;
- 3) relevance to the fields of strategic management, human resource management, strategic human resource management and organizational behavior;
- 4) including the contributions that analyze both the individual (managers) and the organizational

(firm) level and social level of dynamic capabilities;

- 5) including the contributions that concentrate their attention on the definition of dynamic capabilities, the mechanism at the base of their generation, their role in influencing firm performance and leveraging the resources base.

The second step has provided a selection of the contributions that concentrate their attention on the previous criteria.

A total of 84 articles have been selected and at the third stage we excluded works that did not directly focus on the research issues, so getting to 61 items.

For the final stage, a references' analysis from the selected works has been carried out in order to set a systemic review and to find hints for further research.

4 Literature review: from the firm to the network

4.1 Dynamic capabilities: a research on their theoretical origins

The research on firm's competitive advantages occupies a central position in the studies of strategic management. One of the main questions, that has driven many scholars (Penrose, 1959; Barney, 1991; Peteraf, 1993 ;) to the development of new theoretical approaches, can be traced back to the following one: how is competitive advantage generated? In this case, the point is to study if creating or modifying the firm's resource base can ameliorate firm performance (Teece *et al.*, 1997; Vicari and Verona, 2000; Vicari *et al.*, 2011). According to RBT, this means trying to understand what are the capabilities that activate such changing processes.

The answer to this question must be searched through the analysis and the review of the theories that have emphasized the importance of strategic firm's assets and their contribution to the creation of sustainable competitive advantage. According to this perspective, Resource-based Theory (RBT) has offered a deep explanation of the mechanisms that lead to the firm' success, highlighting the importance of the bundle of endogenous firm's resources for the long-run competitive advantage.

As known, the term "strategic resources" encloses a wider meaning that goes beyond its mere sense as it encompasses the firm's strategic assets, capabilities, organizational processes, firm attributes, information, and knowledge (Grant, 1991; Bharadwaj, 2000).

This classical view contemplates the vision that both the control and the exploitation of internal resources can give interesting results in terms of economic rents, if these resources are valuable, rare, difficult to imitate by competitors (Hoopes *et al.*, 2003), and effectively exploited by the organization.

Besides, in the late '90s of the twentieth century, a perspective's reversal suggested by the abrupt and rapid changes crossing the firm's boundaries, has taken place in the field of strategic management. Indeed, the needs that the internal resources must answer, address and match the external changing environments has encouraged many scholars (Teece and Pisano, 1994; Teece *et al.*, 1997; Eisenhardt, 2000; Winter, 2003, Zahra *et al.*, 2006, Zollo and Winter, 2002; Pilotti and Belussi, 2006) in introducing a new approach that represents an evolution of the resource-based theory. The development of this theory is always linked, in the literature, to the above question as it provides how the competitive advantage is created with an additional element, shaped by the need for innovation and changes.

Hence, the DC approach (Helfat *et al.*, 2007), as we have already underlined, represents an extension to the RBT since it tries to explain the issue of resource changes in front of external dynamism (Amit and Schoemaker, 1993; D'Aveni, 1994; Wang and Ahmed, 2007). Furthermore, Zott (2003) points out that DC are more than an extension to RBT "since they manipulate the resources and capabilities that directly engender rents".

Teece *et al.* (1997) stress their attention on the meaning of DC, defining them as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" (1997, p. 516).

Although many years have passed from the first seminal work on the issue (Teece *et al.*, 1997), there is still an open debate around the term "dynamic". Indeed, whereas many scholars agree that "dynamic" refers to "environmental dynamism", others (Ambrosini and Bowman, 2009, p.35) argue that "dynamic" can refer to change in the resource base, to the renewal of resources".

Bowman and Ambrosini (2009) highlight a very important shift in the dynamic capabilities approach as the "dynamism" is considered an overlapping component between the environmental dynamism and the way through which the DC, interacting with the firm's resource base, allow to modify the same resource base in a dynamic context.

Sharing this perspective, according to which these capabilities are dynamic both for the environmental dynamism and for their intrinsic traits, the question is also if they exist and operate only in instable and dynamic context.

The answer to this question can be tracked in the works of Eisenhardt and Martin (2000) and Ambrosini, Bowman and Collier (2009). These authors, starting from outlining the distinctive features of stable environments, suggest a new and very interesting view of the DC approach.

According to Duncan (1972), the environment can be measured through two dimensions (Emery and Trist, 1965; Thompson, 1967): the simple/complex dimension and the static/dynamic dimension. The second one regards the degree of change provoked by the external context. As regards the stable environment, it is possible to argue that the number of changes is little and whereas these occur, they are more predictable. Although the static contexts predict environmental certainty, the firm's resources equally "need for continuous improvement" (Ambrosini, Bowman and Collier, 2009). For this reason, Eisenhardt and Martin (2000) and Ambrosini *et al.* (2009) distinguish the incremental dynamic capabilities, the renewing dynamic capabilities and regenerative dynamic capabilities. The renewing capabilities and the regenerating ones can refer to both more rapid changes and to radical one in relative stable markets. If we consider that the Hapag Lloyd used to operate in heavy industries, which were not dynamic but at a stage of maturity, and then converted itself into a tourist firm, this shows how significant changes can occur even in stable contexts.

The incremental DC allow to realize incremental changes on the resource base in order to regularly adjust and adapt the bundle of firm's resources (Ambrosini *et al.*, 2009; Eisenhardt, 2000; Zollo and Winter, 2002). Therefore, according to this view, DC can explain how organizations generate and sustain competitive advantage in both stable and dynamic environments.

Once these preliminary "reliefs" have been made, it is appropriate to review the definitions of the most important literary contribution (Table 1).

Table 1. DC most important definitions

Study	Definition
Teece <i>et al.</i> , 1997, p. 515	The firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments.
Eisenhardt and Martin, 2000	the firm's processes that use resources – specifically the processes to integrate, reconfigure, gain and release resources – to match or even create market change. Dynamic capabilities thus are the organizational and strategic routines by which firms achieve new resources configurations as markets emerge, collide, split, evolve and die.
Zollo and Winter, 2002	A dynamic capability is a learned and stable pattern of collective activity through which the organization systematically generates and modifies its operating routines.
Winter, 2003	are those that operate to extend, modify or create ordinary capabilities.

Zahra et al., 2006	the abilities to reconfigure a firm's resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker.
Wang and Ahmend, 2007	firm's behavioural orientation to constantly integrate, reconfigure, renew and recreate its resources and capabilities, and most importantly, upgrade and reconstruct its core capabilities in response to the changing environment to attain and sustain competitive advantage.
Helfat et al., 2007	- the capacity of an organization to purposefully create, extend or modify its resource base. -the capacity of an organization to purposefully create, extend, or modify its resource base.
Teece, 2007	the foundation of enterprise-level competitive advantage in regimes of rapid (technological) change.
Helfat and Winter, 2011	support far from radical change in the short run, and not necessarily in rapidly changing environments—to which the example of outlet proliferation, which occurred in relatively placid environments, attests.

Source: Our Elaboration

From this analysis, it comes out:

1. scholars differently define them according to the various theoretical lens that their background and research traditions have influenced. Based on a previous study of Della Corte and Del Gaudio (2012), it emerges that “for Teece *et al.* (1997) and Zahra *et al.* (2006) dynamic capabilities are “abilities”, for Eisenhardt and Martin (2000) “processes”, for Helfat *et al.* (2007) “capacity”, for Wang and Ahmend (2007) are “behavioural orientation” and they add “dc are not simply processes, but embedded in processes”, while Zollo and Winter (2002) and Winter (2003) define them in terms of “routines” (Easterby-Smith *et al.*, 2009)”,
2. the evolution of Teece's definition (see Teece *et al.*, 1997 and Teece, 2007) highlights the necessity to link “the effects and consequences of dynamic capabilities, particularly in regard to market advantages and firm performance” (Easterby-Smith *et al.*, 2009)”, marking a changing in the object comparing to the first definition;
3. there is not yet a “common understanding” (Easterby-Smith *et al.*, 2009) around the different definitions and, consequently, a strong development of empirical works is affected by the lack of a unique framework;
4. these “definitions are implicitly tautological” (Zahra *et al.*, 2006.).

4.2 What are the antecedents to dynamic capabilities? Are there different levels of analysis?

It is relevant to verify whether academic researches clearly distinguish and find the antecedents to dynamic capabilities at individual, organizational and social level and if it is possible to establish clear boundaries with these different levels of analysis. This means that the DC origins may lie in only one level of analysis or overstep the single level to overlap then multiple perspectives. If this discourse seems to be coherent and simple, there are some points in practice that make it difficult to encounter both

conceptual and empirical works explaining these research dilemmas and clearly showing the influence of each level on the creation of DC.

In order to understand what is the source that determines the DC's origin, it is relevant to analyze some studies, highlighting the different levels of DC determinants.

This deeper understanding allows to better cover a research gap since many studies in DC approach concentrate their attention on the single level of analysis without linking the cyclic nature of DC determinants.

As regards the individual level, some scholars ascribe the micro-level origins to the managerial ability as it plays a strategic role in identifying opportunities and reconfiguring firm's resources (Augier and Teece, 2009; Chadwick and Dabu, 2009), in using DC (Ambrosini and Bowman, 2009; King and Tucci, 2002) and developing them (Adner and Helfat, 2006).

Furthermore, Rindova and Kotha (2000) highlight that the antecedents reside in the top management team as it is considered a key actor in the process of DC development, supported by its organizational vision.

If we consider the sensing and seizing dimensions (Teece, 2007) richly analyzed in the DC literature, it is needful to remind some studies (Harrelid *et al.*, 2007; Rosenbloom, 2000; Zahra *et al.*, 2006) as they underline the importance of manager's ability, skills, experience and motivation level in the process of DC creation.

Besides, other works (Rodenbach and Brettel, 2012) specify that the CEO experience (i.e., age and CEO international experience) can be considered as an important attribute able to generate the DC.

If we have, up to now, emphasized the importance of the individual ability in the process of DC creation, it is also relevant to point out that the development of the DC requires high skills and abilities (Adner and Helfat, 2003), both for the renewal of the resource base and for the regeneration of DC (Ambrosini *et al.*, 2009).

Despite the high number of conceptual and theoretical works that analyze the individual level,

there is an increasing attention in demonstrating how the micro-level origins reside in the managerial component (Adner and Helfat, 2006; MacCormack and Iansiti, 2009, Augier and Teece, 2009; Rothaermel and Hess, 2007).

The reference literature appears less rich in academic contributions that clearly explain the implications of the organizational and social level of analysis.

Indeed, scholars have put more attention on the individual level of analysis rather than on the organizational level. One of the possible explanations, related to a not extensive and clear literature development on this issue, can be led to this simple observation: “organizations are made up of individuals” (Felin and Foss, 2005).

If this statement can be considered as true, it is equally important to recall another aspect, underlining that organization includes “various aggregate concepts” (Felin and Foss, 2005).

Hence, the organizational level, as source of DC generation, has to be analyzed in the light of the “collettive soul”, expression of what the organization stands for. In this direction Helfat *et al.* (2007) argue that DC originate from the organization’s conscious actions. Indeed, firm behavior, organizational change and firm heterogeneity influence the generation of DC (Rodenbach and Brette, 2012).

Indeed, the study of Zollo and Winter (2002) can be considered the first work that explores the organizational mechanism at the basis (experience accumulation, knowledge articulation, and knowledge codification) of the creation of DC. Macher and Mowery (2009), starting from Zollo and Winter (2002) study, empirically demonstrate and measure the learning mechanisms and their effects (static and dynamic) on performance in semiconductor manufacturing. In the same direction, Zollo and Singh (2004) explain that knowledge codification is strictly linked to the accumulated experience within the organization and represents a DC antecedent at firm level.

Another important study (Zahra *et al.*, 2006) explains what are the mechanism at the basis of the deployment and the use of dynamic capabilities. Zahra *et al.* (2006) identify four components: improvisation, trial and error, and imitation. Improvisation refers to the capability to create or enact new solutions in unexpected way as regard the timing and the modality. They also underline that improvisation is more used by young firms.

Through trial-and-error learning firm is able to build a set of capabilities to after effectively use them. Here also they state that trial-and-error is useful “for the early development of the firm”.

Hence, if the DC origins at organizational level emphasize the importance of processes, routines (Zollo and Winter, 2002), learning mechanisms and knowledge processes (Easterby-Smith and Prieto, 2008, Zollo and Winter, 2002) as sources of DC

creation, it is also important to understand how the network can be DC generator and how firms may exploit the set of opportunities, arising from the dynamic networking capability.

A recent study of Agarwal and Selen (2009) points out that the collaborative innovative capacity can be considered as an antecedent to DC. This capability refers to the ability in using and orchestrating the external network partners and recalls the concept of “network visioning” (Möller and Svahn, 2003), that is the network capability in recognizing opportunities that are able to increase the network value.

Besides, inter-firm networks allow generating opportunities that lie beyond the boundaries of the firm although these can be than appropriated by the organization, with strong implications for the value creation. Such interactions, that begin from the network and shape DC, influence the firm’s context and the way through which manager and organization (in its wider meaning, including the above mentioned organizational mechanism) sense, shape opportunities and threats and seize them through the development of new products, processes, or services (Teece, 2007). Hence, the generation of new DC or their development and improvement can be generated from micro-level origins, both individual and organizational, but influenced by the networks dynamics.

If it true that the DC determinants at network level facilitate the value-network formations (Gebauer *et al.*, 2012), it is also relevant to observe that DC, generating from external stimuli, are after recombined to transfer the external acquired knowledge inside the firm. This represents the co-evolution of DC and confirms their cyclical nature.

The work of Teece (2007) follows the same roots, overlapping all levels of analysis, as it stresses more attention on reconfiguration capability linked to the individual knowledge ability. Moreover, Teece argues that the central source to DC antecedents, represented by the organization, need to be decomposed according the strategic assets, which shapes the firm’s structure.

Another study (Rothaermel and Hess, 2007) underlines that the DC determinants must be conceived as a global framework that encompasses the intellectual human capital, the organizational ability in recognizing, shaping and reinforcing the internal knowledge and, finally, the social effects on the innovative and dynamic firm’s aspects.

Hence, the importance to analyze, according an overlapping perspective, all three levels of analysis is generated by the cyclical nature that DC themselves pursue. They in fact develop from the individual level to the organizational and network ones (Hawass, 2010) or, on the contrary, from the network level to the organizational or/and the individual ones. In this direction, Zollo and Winter (2002) well explain that the DC creation process crosses more levels, where

the individuals or groups represent the primary players of DC antecedents to later match the organizational sources and encounter the network's forces, that consequently constitute a DC determinants. On the other side, the lack of clear contributions, both theoretical and empirical, that

explains how the network can leverage the individual and the organizational levels, highlights the presence of a research gap since the academic works do not underline the continuous interaction among these three levels and their importance in the mechanisms in DC co-evolution.

Table 2. Studies on DC antecedents at different levels of analysis

Study	Individual	Organizational	Social
Adner and Helfat (2006)	*		
Agarwal and Selen (2009)			*
Augier and Teece (2009)	*		
Blayer and Coff (2003)			*
Easterby-Smith and Prieto (2008)		*	
Harreld et al. (2007)	*		
Hawass (2010)	*	*	*
Helfat et al (2007)	*		
McCormack and Iansiti (2009)			
Macher and Mowery (2009)		*	
Rindova and Kotha (2000)	*		
Rodenbach and Brettel (2012)	*	*	
Rosenbloom (2000)			
Rothaermel and Hess (2007)	*	*	*
Teece (2007)	*	*	*
Zahra et al (2006)	*	*	
Zollo and Winter (2002)	*	*	*

Source: Our Elaboration

If we consider the DC approach as a global framework able to encompass all three levels of analysis, it is important to recall the relational view (Dyer and Hatch, 2006; Dyer and Singh, 1998) concept and underline how this issue can be embedded within the DC theory. As Teece (2007) points out, the development of the DC approach requires relational aspects including the ability to collaborate with other firms.

Shifting our attention from the internal perspective to the external one, we can argue that DC internally leverage resource base of the firm and externally act on “distinctive resources of alliance partners” that are able to generate rents (Dyer and Singh, 1998).

The relational view comes out from firms' behavior within the network relations since they allow to share knowledge and routines as well as resources and capabilities. This perspective suggests that DC generated from the network can be created beyond firm boundaries to after be integrated in firm's activities and routines.

Besides the relational view “facilitates long-term cooperation” (Espino-Rodríguez, and Rodríguez-Díaz, 2008) and allows the firm to acquire new experience and knowledge.

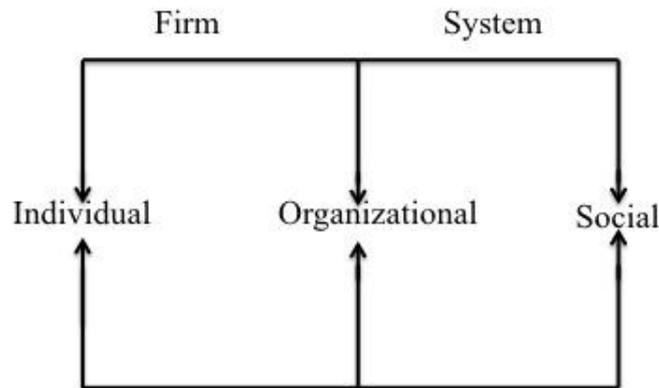
Hence, the DC generated from network inter relationship strengthen the internal mechanisms both

at firm level and individual level able to produce process level performance and firm level performance.

This discussion leads to a conclusion that the antecedents to dynamic capabilities need to be better explored and analyzed since it emerges a clear gap in DC literature:

Gap 1: *Whereas some scholars identify a unique source of DC determinants and the individual level of analysis is well developed, a clear gap exists with reference to the organizational and social levels (Table 2-see appendix). In fact, literary contributions do not well explain the contents and mechanisms of the cyclical nature of DC.*

Gap2: *Although many scholars (Hawass, 2010; Teece, 2007; Zollo and Winter, 2002; Eisenhardt and Martin, 2000; Rothaermel and Hess, 2007) agree that the antecedents to DC lay at all these levels of analysis, it would be appropriate to develop a theoretical support in order to clearly understand all the steps that, moving from the individual level, arrive at the social level of analysis or vice versa. Indeed, the current research highlights the lack of explicit transition mechanisms among all levels and, more precisely, the manner through which each level influences and determines the generation of new antecedents to DC.*

Figure 1. The cyclical nature of dynamic capabilities

Source: Our Elaboration.

4.3 How dynamic capabilities leverage firm's resource base?

As we have already anticipated, the assumption that DC leverage resource base, is useful now to first understand if different types of DC exist or if they can be conceived as a unique typology; second, whereas DC differentiate according the object they leverage, it is necessary to analyze the way through which these capabilities operate; and third, whether or not DC can only leverage resource base or other types of strategic factors.

A literary *excursus* helps us in categorizing the current typologies. For the purpose of this specific aim, we first recall the four Collis' categories and though his study dates back to 1994, it is important to remind that the first seminal work on DC appears in 1997 (Teece *et al.*).

As regards the first type of Collis' classification, these capabilities "perform the basic functional activities of the firm" (1994, p.145); the second are necessary in order to dynamically improve the firm's assets and activities; the third allows to recognize the endogenous value of strategic resources or refers to the capability of being proactive in comparison with the implemented strategies by competitors; and finally, the fourth category regards the so called "higher order capabilities" or "meta-capabilities", linked to the knowledge-based and learning capabilities, that may represent the source of competitive advantage.

In the same direction, Winter (2003) distinguished three typologies: ordinary or "zero-level" capabilities, first level capabilities and higher-order capabilities.

The first typology encloses those that have a short run vision since they allow to "make a living" (Winter, 2003) in the present. The second refers to the capability "to extend, modify or create" the zero level capabilities while the last category encloses the higher-order capabilities that, consequently, act on first level capabilities.

Besides, another systematization comes out from the work of Ambrosini *et al* (2009). They also categorize three kinds of DC: incremental, renewing and regenerative. With regard to incremental DC, they allow incremental improvement of existing firm's resources and strategic factors. Moreover, the renewing Dc act on the reconfiguration, change and modifications on the resource base in order to face with dynamically-competitive environment.

Finally, the regenerative DC influence the current bundle of dynamic capabilities.

Although the theoretical distinction among these different typologies of DC appears clear and exhaustive, two gaps come out:

Gap 3: *there are some difficulties in practice due to the lack of empirical works in support of this issue.*

Gap 4: *the leveraging activity both on resource base and dynamic capabilities (regenerative and renewing capabilities) need more explanation in terms of content and mechanisms that lead to the effective leveraging.*

4.4 How dynamic capabilities generate a sustainable competitive advantage? Or better, what is the DC contribution on firm's performance?

Numerous researchers (Teece *et al.*, 1997; Zott, 2003; Jantunen *et al.*, 2005; Wu, 2006; Macher and Mowery, 2009) agree that DC play a key role in determining the firm's competitive advantage. The firm's growth, its success, the economic benefits and the different performance among firm's of the same sector (Zott, 2003) are important elements that attest, according to the different results, the degree of DC use.

More precisely, Luo (2002) and Tallman and Fladmoe-Lindquist (2002) in pointing out that DC have two dimensions (capability exploitation and capability upgrading), indicate these components as needful elements, that influence, in different terms, the firm's competitive advantage.

Indeed, while the capability exploitation is essential for the gain of competitive advantage, the capability upgrading is linked to the growth and the refreshment of sustainable competitive advantage (Liu and Hsu, 2011). This depends on the specific features of each DC dimension. As regard the two dimensions, the first refers to the DC exploitation on resource base and the second regards the capacity to generate new bundle of resources.

If, on the one hand, scholars point out that DC contribute in influencing firm's performance, it is necessary, on the other, to understand how dc can impact on performance and what is the process that lead to the firm's success.

Indeed, the reason why the leveraging, both on resource base and dynamic capabilities itself, is considered a key activity in the process of value creation may be explained through the fact that DC act on the strategic factors in order to convert them in new sources of competitive advantage (Henderson and Cockburn, 1994).

Hence, in order to answer the question "*How dynamic capabilities generate a sustainable competitive advantage?*" it is important to identify all the antecedents that lead to sustainable competitive advantage.

According to this view, as we have already underlined, the leveraging activity constitute the central stone in the process that can create the firm's success as it allows to configure a new set of resources and strategies (Cepeda and Vera, 2007; Eisenhardt and Martin, 2000 p. 1107).

Other authors (Makadok, 2001) explore the antecedents to dc, identifying the capability-building mechanism as important driver for the rent creation, that act after acquiring new assets, leveraging on resource base and effective use them.

The first definition of DC helps describing the route that leads to firm value creation. Indeed, Teece's definition (1997) "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments" underlines that the value creation is the result of the managerial ability in both identifying opportunities and transforming the resource base.

The current confusion around the impacts of DC on firm performance and the mechanisms,

constituting the process that undergird the generation of competitive advantage, is due to the fact that scholars recognize only the impact on firm level performance.

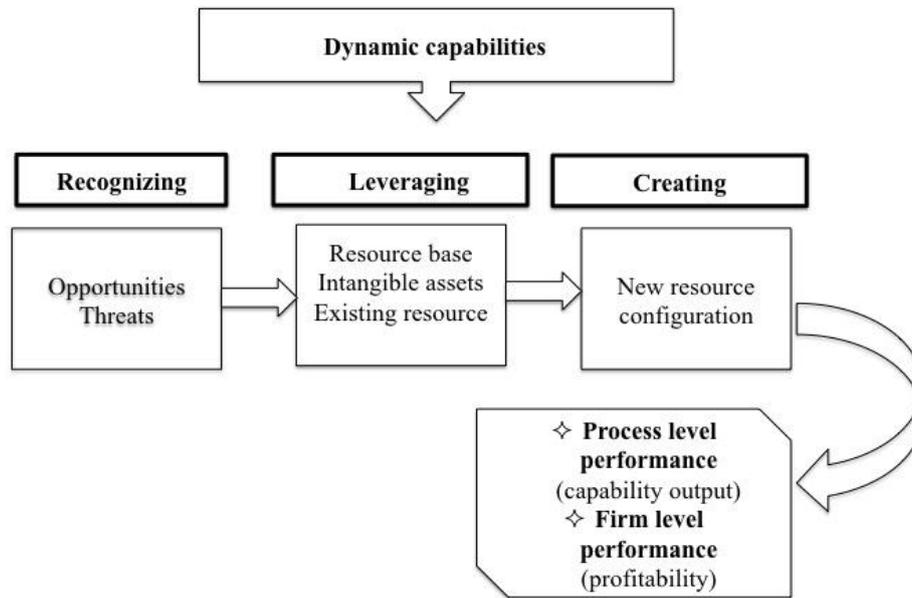
Despite numerous conceptual works, the dynamic capabilities approach needs to be enriched by a wider empirical base that clearly distinguishes the different performance results.

In this direction, Drnevich and Kriauciunas (2011) have explored the linkage between the dynamic capabilities and both process level performance and firm level performance. Indeed, this study is built on the awareness that it is not only the profitability to be measured (firm level performance) but also the capability output (process level performance) need to be considered as an important result, whether or not in economic terms but according innovative factors. Indeed, the key reading for the process level performance may be traced back in the attributes analyzed in the study of Wu (2005): speed of innovation, speed in responding to the market, production efficiency, product quality, manufacturing flexibility, R&D capability.

The generated impact of DC on the different level of performance may be positive for the process level performance and negative (The negative impact on firm performance may depend from a set of elements (Drnevich and Kriauciunas, 2011): the management of DC, the measurement of the expected results; the DC use can be linked to the willingness in compensating past poor performance.) for the firm-level performance.

This vision suggests clear gaps in the current debate on DC. These are:

Gap 5: *Although many authors recognize that DC do not directly lead to sustainable competitive advantage (Cepeda and Vera, 2007; Eisenhardt and Martin, 2000; Weerawardena and Mavondo, 2011), there is still a strong need in enriching the empirical base for support of this thesis in order to understand the process through which DC generate, evolve and die (Eisenhardt and Martin, 2000);* **Gap 6:** *the future researches on DC must share the vision of Drnevich and Kriauciunas (2011) study, according to which DC impact both on process level and firm level. A stronger empirical support is necessary in literature.*

Figure 2. The spiral process of dynamic capabilities

Source: Della Corte and Del Gaudio, 2012

5 Knowledge-based dynamic capabilities

Literature on dynamic capabilities recognizes knowledge resources as a strategic resource for contributing and sustaining firm's competitive advantage (Grant, 1996). The knowledge component in dynamic capabilities makes them knowledge-based dynamic capabilities since they leverage knowledge-based resources and are composed of knowledge activities such as knowledge absorption, knowledge creation, knowledge storage, and knowledge application (Wang et al., 2007).

Passing from an individual level to an organizational and social level, learning and cumulated knowledge become very important issues to examine.

Considering a very specific set of dynamic capabilities, that are those strictly connected to knowledge, the concept of dynamic capabilities needs to be extended according to the knowledge-based perspective. Indeed, the firm's ability "to acquire, generate and combine knowledge resources to sense, explore and address environment dynamics" (Zheng et al., 2011) is strictly linked to its absorptive capacity in acquiring knowledge from both internal and external environment.

The knowledge-based dynamic capabilities encompass the knowledge-based dynamic capabilities and the dynamic capabilities approaches.

Although many scholars, that deal with dynamic capabilities approach, never used the expression "knowledge-based dynamic capabilities", however they have mentioned some aspects of this issue without systematize a specific contribution.

This paper aims at analyzing the dynamic capabilities in the light of knowledge-based perspective.

Zheng *et al* identify three components of knowledge-based dynamic capabilities: knowledge acquisition capabilities (KAC), knowledge generation capabilities (KGC), and knowledge combination capabilities (KCC). According to the authors these three components are not mutually exclusive but conversely, they are closely related to each other.

KAC refers to the firm's ability to identify and acquire both external and internal knowledge. It is universally accepted by scholars that DC allow to identify opportunities and shape them in order to gain competitive advantage. In this direction, it is important to understand how and to what extent the knowledge components can influence the process of opportunities identification.

KAC recalls two main concepts: knowledge exploitation and knowledge exploration (Bierly and Chakrabarti, 1996). The first one refers to the firm's ability to improve and exploit its current capabilities (internal knowledge) whereas the second is based on the knowledge exploration outside its boundaries (external knowledge).

When firms activate learning mechanisms within their boundaries from rooted and unused knowledge over time, they try to acquire this knowledge from internal sources.

Firms can appropriate knowledge form external environment through the understanding of the changing demand, the dynamism of the markets, the customer needs and the attitudes of suppliers and competitors (Teece, 2007). The firm's capacity to acquire knowledge from external sources is called "absorptive capacity": Zahra and George (2002, p.

188) argue that it is a dynamic capability able to influence the creation of new knowledge that has a great impact on the origin of the organizational capabilities and, at the same time, expands its knowledge base (López-Sáez *et al.*, 2010).

Thus, external knowledge acquisition is the key factor for the firm's strategic renewal (Lavie, 2006) and the flexibility acquisition that allows competing in dynamic environments.

The second component refers to KGC that enable firms to create/generate new knowledge (Zheng *et al.*, 2011; Davenport and Prusak, 2001). Firms must convert and translate the absorbed external and internal knowledge in new routines, resource and knowledge.

In order to better understand the KGC, it is necessary to decline what are the different knowledge-based capabilities that firms can generate.

In this direction, Zheng *et al.* identify as the output of the knowledge generation activities the technological knowledge, marketing knowledge, managerial knowledge and knowledge itself.

Indeed, the generation of technological knowledge (Blomqvist and Seppänen, 2003), marketing knowledge for the development of new product and the understanding of customer needs, the execution of known procedures (Zollo and Winter, 2002), the accumulation of know-how as one of the most important difficult-to-imitate intangible assets (Teece, 2007) are critical for firm success.

Furthermore, Zapata (2004) points out that there are critical factors in the knowledge generation since organizational culture, communication, leadership style plays an important role in this process.

The third capability refers to the firm's ability to combine not only internal and external knowledge but also knowledge from multiple sources at different levels. Knowledge integration capabilities are important to respond to a changing context (D'Aveni).

These combinative capabilities (Kogut and Zander, 2001; Nelson and Winter, 1982) allow to recombine the existing knowledge and shape it in new forms of knowledge. Indeed, as Kenney and Gudergan point out (2006) "combinative capabilities enable the generation of new permutations of existing knowledge".

According to a knowledge-based perspective, knowledge acquisition and knowledge generation constitute the antecedents of the KCC.

While in the past years some scholars argued (Miles *et al.*, 2000; Powell, 1996) that the interaction between knowledge acquisition and knowledge generation leads to innovation, it is important to point out that the symbiosis between all three dimensions constitutes the key ingredient for the business innovation.

6 Conclusions and hints for further research

The main conclusion emerging from this paper is concerned with the understanding of dynamic capabilities gaps. In summary, this research highlights the lack of broader perspective on dynamic capabilities since current works do not deeply investigate the issue in a very clear way. DC are multiple and the definitions can all be considered as acceptable. However, they refer to different levels of analysis (individual rather than organizational), with all the above singled out gaps. Besides, from an empirical point of view, there is some sort of confusion around the topic and whereas empirical foundations exist, the results appear contradictory if we compare the existing contributions.

In order to better understand the two levels of analysis – individual rather than organizational – dynamic capabilities approach is enriched through knowledge-based perspective. This study explored several aspects of the dynamic capabilities approach and pointed out the limits of previous researches on the topic. The first gap concerns the understanding on mechanisms for the creation and the use of DC. It can be argued that learning mechanisms and individual ability are the main sources of dynamic capabilities generation. Second, as said, there is a need to understand the level (individual, organizational) of antecedents to dynamic capabilities and if the different levels can overlap. Third, it is relevant to highlight that the process through which dynamic capabilities leverage resource base is not clear. Hence, empirical investigation concerning this aspect is required in order to give some examples and insights as regard the leveraging process. Fourth, from previous studies emerged that it is difficult to measure the impact of dynamic capabilities on firm's performance. In this direction, there is a need to distinguish the dynamic capabilities contribution on performance according process-level and the firm level.

Finally, this study provides an extension to dynamic capabilities in terms of: knowledge acquisition capabilities, knowledge generation capabilities, and knowledge combination capabilities. Each of these capabilities acts differently on knowledge resource and the interaction among all three capabilities can produce business innovation.

The conclusion therefore is very sharp. Even if undoubtedly DC and KDC can enrich resource-based theory through the attention to resources' changes and new mixes thus inserting dynamism into a more static defined theory, they cannot absolutely be considered as theories or approaches themselves. In RBT view, strategic resources are valuable, rare, difficult or costly to imitate resources. The dynamic ones, whether based on not on knowledge, also help in resource leveraging but they are strategic themselves if they respond to the above mentioned variables.

They are therefore the development of some specific aspects but always inside RBT umbrella.

The issue of dynamism, however, deserves attention in terms of change, both in more turbulent and in more stable context: however, it is a question of intensity and speed but it always matters. Finally, as explained in the paper we do not examine the relational level, which would require a specific deep study, through the lenses of relational view. This would have enlarged too much our literature review but the topic also deserves much more attention in further studies.

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