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# **FIRM RESOURCES' ENTANGLEMENT DETERMINES ITS ABSORPTIVE CAPACITY: A REVIEW TOWARDS A NEW RECONCEPTUALIZATION**

**Hammady Ahmed DINE RABEH**

**Abstract:** The capability of a company to absorb external information is crucial for companies, since knowledge is largely considered as a highly valuable source of competitive advantage. Accordingly, an increasing number of publications dealing with this issue have been performed. A plethora of academic works about absorptive capacity (hereinafter ACAP) indicates a need for reviewing it since there is no common agreement about a unique definition and measurement of the same. This paper, aims at shedding a new light on the state of art of absorptive capacity, offering at the same time a certain reconceptualization which may give a new insight towards a new re-dimensionalization of the ACAP construct. Such approaching is rooted in firm's resources and capabilities, emphasizing the financial aspect, which has almost been neglected in prior researches about this issue.

# FIRM RESOURCES' ENTANGLEMENT DETERMINES ITS ABSORPTIVE CAPACITY: A REVIEW TOWARDS A NEW RECONCEPTUALIZATION

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## TABLE

<b>INTRODUCTION</b>	<b>4</b>
<b>1. ACAP: DEFINITION AND DIMENSIONS</b>	<b>5</b>
1.1. <i>CONCEPTUALIZATION</i>	5
1.2. <i>DIMENSIONS OF FIRM'S ABSORPTIVE CAPACITY</i>	7
1.3. <i>ANTECEDENTS OF FIRM'S ABSORPTIVE CAPACITY</i>	8
<b>2. ACAP MAIN IMPLICATIONS/ OUTCOMES</b>	<b>10</b>
2.1. <i>IMPLICATIONS</i>	10
2.2. <i>ABSORPTIVE CAPACITY AS A KEY SUCCESS FOR INNOVATION DEVELOPMENT</i>	11
2.3. <i>ABSORPTIVE CAPACITY DETERMINES LEARNING CAPABILITY</i>	13
<b>3. MULTILEVELNESS, FUZZINESS AND THE RECONCEPTUALIZATION NEED</b>	<b>14</b>
3.1. <i>MULTILEVELNESS OF ABSORPTIVE CAPACITY</i>	14
3.2. <i>TOWARDS A NEW DYNAMIC OPERATIONALIZATION OF ACAP</i>	15
<b>FUTURE RESEARCH LINES AND TENDENCIES</b>	<b>17</b>
<b>REFERENCES</b>	<b>17</b>

## INTRODUCTION

In the first half of last century; economists such as Joseph Schumpeter, Friedrich Hayek and Fritz Machlup, among others, did recognize the role of knowledge in the economic growth, performing therefore many studies about the impact of knowledge on the productivity in its wide manifestations. However, they did prioritize arguing the key role of knowledge ahead of analyzing the processes of knowledge production within companies. Later on, the evolutionary theory (Nelson and Winter, 1982) emphasize the role of *knowledge* in *organizational routines* (Teece *et al.*, 1997, Teece, 2007) in which the performance is held. Recent studies deal with systems of innovation management, especially in business administration, see for example Nonaka (1991, 1994), Nonaka and Takeuchi (1995) and Spender (1996). Thus, concepts such as learning, absorptive capacity, organizational memory and so forth were coined (even adapted from other fields) aiming at understanding how companies can leverage internal and external knowledge for business ends. The first-generation of studies about absorptive capacity revolves around R&D activities and prior related knowledge (Cohen and Levinthal, 1990), while the recent tendency (Zahra and George, 2002, Lane *et al.*, 2006, Lane and Lubatkin, 1998, Lane *et al.*, 2001) views ACAP as a dynamic capability that companies should continuously and successfully manage for guarantee knowledge flows and dissemination inside the company. Both views assess the key role of ACAP in organizational learning and innovation generation (e.g. Cohen and Levinthal, 1990, Fabrizio, 2009, Fosfuri and Tribó, 2008, Gebauer *et al.*, 2012, Jansen *et al.*, 2005, Kostopoulos *et al.*, 2011, Lane and Lubatkin, 1998).

The increasing number of publications dealing with ACAP reflects the richness of the relatively new notion within the organization field. Many authors have developed a plethora of conceptual models, conducting numerous empirical studies. Although several models have been performed, scholars such as Lane *et al.* (2006) and Volberda *et al.* (2010) argue not only the multidimensionality but also the inaccurate identification of ACAP, pointing out a clear lack of consensus about an operational definition of the same. Such discrepancy is recognized through the contribution of Camisón and Forés (2010) who compiled different definitions and measurement of ACAP manipulated by various authors. Furthermore, aiming at shedding light on the question of problem of “reification” of ACAP construct, Lane *et al.* (2006: 833) stated “there have been surprisingly few review articles for such a large research stream, and those have tended to be relatively brief reviews presented in support of an extension of the construct’s definition (e.g., see Van den Bosch, Volberda, & De Boer, 1999, and Zahra & George, 2002)”. I argue, additionally, that the ambiguity in ACAP definition triggers a dilemma about the operationalization of this construct. Therefore, authors widely differ is also persistent. Cohen and Levinthal (1990) measure ACAP as the R&D expenditure divided by annual sales. Some of the late articles adopt Cohen and Levinthal’s measurement (e.g. Tsai, 2001, Zahra and Hayton, 2008), others measure it otherwise. For example Petroni and Panciroli (2002) firm’s ACAP is measured via R&D effort in training personnel. However, Mangematin and Nesta (1999) view that ACAP in not just the R&D activities as previously indicated, using a set of variables that include R&D expenditure and number of R&D laboratories, number of researchers in the organization, regularity of R&D activities, links with public research institutes, number of publications and number of patents. These examples show the dissimilarities in understanding firm ability of external knowledge absorption.

Based on the previously indicated evidences, this work aims at shedding a new light on the evolution of ACAP, providing finally a new reconceptualization, which is mainly rooted in

the structure of companies' resources as seen as social, technical and financial. Social structure is related to personal credentials, whereas technical structure includes things such as technology and organizational measures. It can also be seen as internal (socio-technical), external (relational...) and financial. Based on this logic, a potential re-dimensionalization is suggested.

The work is organized as follows: it begins with a review of the different definitions, dimensions and outcomes of ACAP as reported by literature. This will show how important is this capability for companies' learning and innovation, which justifies the attention paid to the same, and also the state of art of such issue. Having analyzed the most significant aspects of ACAP, and pointing out the need of reviewing the ACAP concept, the next point proposes a new conceptualization for fulfilling the salient need. The paper ends with the main future lines to be analyzed that the discussions open and the significant limits of the same.

## **1. ACAP: DEFINITION AND DIMENSIONS**

### **1.1. *Conceptualization***

The concept of *absorptive capacity* is rooted in macroeconomics, in which it refers to “the total amount of capital, or the amount of foreign capital, or the amount of foreign aid (capital plus technical assistance) that a developing country can use productively” (Adler, 1965), or, to the overall ability of an economy of a country “to utilize capital productively” (Feeny and de Silva, 2012). So, originally, the term absorptive capacity was introduced to qualify the broad capacity of a given economy to leverage external material or/and financial resources. This reflects the philosophy of industrial economic period, as capitals and material resources were considered to be the almost pivotal factors for ongoing growth. Thus, companies that were able to absorb and manipulate external assets were considered to be successful.

Recently, the notion absorptive capacity has become a core concept in most of the researches that adopt theories of resource-based view, knowledge-based view, dynamic capabilities, learning, innovation, managerial cognition and co-evolutionary (Volberda *et al.*, 2010). Furthermore, this construct has widely been examined within different fields, such as managerial cognition (Lenox and King, 2004), strategic management (Lane *et al.*, 2006), innovation (Cohen and Levinthal, 1990, Rothaermel and Alexandre, 2009, Fabrizio, 2009) technology management (Rothaermel and Alexandre, 2009, Schilling, 1998), international business (Kedia and Bhagat, 1988), organizational economics (Luo, 2013, Glass and Saggi, 1998) and open innovation (Lichtenthaler, 2009, Spithoven *et al.*, 2011) and so forth. Despite the huge increase in the absorptive capacity literature, there is no common consensus about a unique definition, determinant dimensions, antecedents and even about measurement scales of such a construct (e.g. Camisón and Forés, 2010, Todorova and Durisin, 2007, Zahra and George, 2002, Lane *et al.*, 2006, Volberda *et al.*, 2010, Sun and Anderson, 2010, Murovec and Prodan, 2009, Lane and Lubatkin, 1998, Cohen and Levinthal, 1990).

Many contributions within these approaches have been formulated assessing the role of absorptive capacity in the processes whereby companies acquire and leverage knowledge (Zahra and George, 2002, Lavie and Rosenkopf, 2006, Czarnitzki and Kraft, 2004). Thus, the resource-based, knowledge-based and the dynamic capabilities approaches describe absorptive capacity as a strategically valuable capability for creating competitive advantage and higher organizational performance through “knowledge selection and linkage” (Larrañeta

et al., 2012). Furthermore, in the context of organizational learning, it allows companies to acquire the latest market knowledge, and it is, therefore, considered to be a key antecedent of successful innovation development.

A plethora of definitions have, then, been provided aiming at defining and delimiting the concept of absorptive capacity. Within organizational context, a pioneer definition was introduced by Cohen and Levinthal (1990) as a firm’s “ability to recognize the value of new information, assimilate it, and apply it to commercial ends”. The endogenous driver of their emphasis on absorptive capacity is the fact that they consider “external knowledge does not equally benefit all firms, and that the benefits enjoyed by the firm are determined in part by the firm’s own actions and resources” (Fabrizio, 2009: 255). Therefore, according to them, acquiring just external assets and information is not enough. Instead, companies’ ability to manipulate the acquired knowledge and capabilities determines its real absorptive capacity. Such a definition encloses, in holistic terms, the processes of identification of knowledge existing in companies’ external environments, acquisition e, conversion and insertion of such knowledge in the organizational value creation systems.

In a further development of the term, Zahra and George (2002) re-conceptualize this construct, presenting it as a compound of two different, but complementary subsets: potential absorptive capacity (PACAP) and realized absorptive capacity (RACAP). They identify potential absorptive capacity as the capacity of a company to acquire and assimilate knowledge, while the realized absorptive capacity explains the capacity to transfer knowledge into the company and exploit it in the different commercial purposes. Likewise, Lane *et al.* (2006) consider it to be a three-dimensional processes, stating that: “Absorptive capacity is a firm’s ability to utilize externally held knowledge through three sequential processes: recognizing and understanding potentially valuable new knowledge outside the firm through exploratory learning, assimilating valuable new knowledge through transformative learning, and using the assimilated knowledge to create new knowledge and commercial outputs through exploitative learning.” The following table 1 shows the referential definitions, recognized through literature revision.

Table 1: Referential definitions of absorptive capacity

Referential definitions	Authors
The “ability to identify, assimilate, and exploit knowledge from the environment”. <i>(single construct)</i>	Cohen and Levinthal (1990)
The ability of a company to identify, assimilate, acquire, transform and use external knowledge in its commercial ends. <i>(Double subset construct)</i> 1- - PACAP: Assimilation, acquisition 2- - RACAP: Transformation, exploitation	Zahra and George (2002)
“A firm’s ability to utilize externally held knowledge through three sequential processes: recognizing and understanding potentially valuable new knowledge outside the firm through exploratory learning, assimilating valuable new knowledge through transformative learning, and using the assimilated knowledge to create new knowledge and commercial outputs through exploitative learning.” <i>(single construct)</i>	(Lane <i>et al.</i> , 2006)

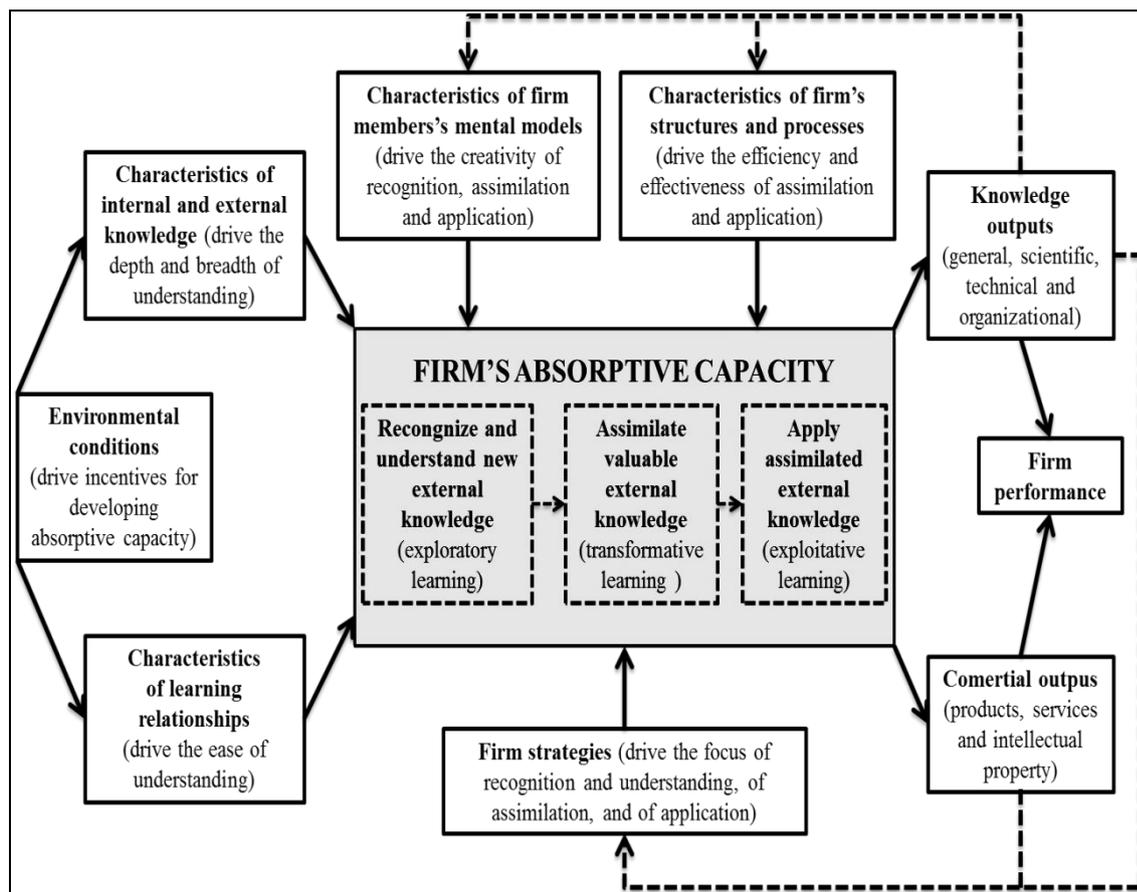
Source: Compiled by author, based on different sources

## 1.2. Dimensions of firm's Absorptive Capacity

For Cohen and Levinthal (1990) dimensions of absorptive capacity consist of the processes of identification, assimilation and exploitation of external knowledge. Many researches adopt such a categorization. Later contributions widely adopt the reconceptualization proposed by Zahra and George (2002), subdividing it into two subsets: potential and realized, where potential absorptive capacity stands for the acquisition and assimilation capacities, while realized absorptive capacity deals with transformation and application of knowledge within the different commercial ends of companies (e.g. Jansen et al., 2005, Fosfuri and Tribó, 2008, Poh-Lin, Winter 2009, Volberda et al., 2010, Camisón and Forés, 2010).

Among the recent contributions about the absorptive capacity the one presented by Lane *et al.* (2006) in which they assessed 289 articles selected from 14 indexed journals addressing differently this issue. The studied papers pertain to management field, and they argued that “research in this area is fundamentally driven by five critical assumptions which have led to its reification”, and also propose a model including the processes, antecedents and outcomes of absorptive capacity within companies as follows:

Figure 2: The model of Lane *et al.* (2006)



Source: Lane *et al.* (2006)

According to Lane *et al.* (2006), the characteristics of knowledge itself and those of learning mechanisms facilitate knowledge understanding and absorption. This implies that although knowledge is available in companies' environment, the degree of leveraging depends on three key variables. It depends directly on the nature of the targeted knowledge and the intrinsic

specificities of learning mechanisms adopted by the company in question. Furthermore, environmental conditions such as technological and market dynamism steer companies' intentions towards knowledge acquisition, shaping their capability to leverage such knowledge. The effect of environmental dynamism on learning outcomes was also analyzed and assessed by Jansen *et al.* (2009). Likewise, organizational internal variables such as firm's structure, processes and characteristics of staff and the adopted strategies affect its capacity of knowledge absorption.

Studies differ in determining the ACAP sources. The *first-generation understanding* of ACAP considers R&D, manager experience and capabilities, patents and inter-organizational relationships as the underpinning sources of ACAP (Adler, 1965, Cohen and Levinthal, 1990). Recent studies, instead, argue that absorptive capacity is a multidimensional concept, and therefore it goes beyond the aforementioned criterion. Instead, it is rooted partially in other elements related to the environment, the process and the organizational structures, etc. (e.g. Lane and Lubatkin, 1998, Van den Bosch *et al.*, 1999, Jansen *et al.*, 2005, Lichtenthaler, 2009, Lane *et al.*, 2001, Minbaeva *et al.*, 2003). Consequently, there is a greater tendency to measure ACAP considering, apart from knowledge base, aspects like motivation, personal abilities and management mechanisms. Based on different studies, Camisón and Forés (2010) highlighted the dimensions of absorptive capacity, as follows:

Table 4: Dimensions of ACAP

Dimensions	Definition	Antecedents
Acquisition	Acquisition capacity is a firm's ability to locate, identify, value and acquire external knowledge that is critical to its operations.	Lane and Lubatkin (1998), Zahra and George (2002), Liao <i>et al.</i> (2003)
Assimilation	Assimilation capacity refers to a firm's capacity to absorb external knowledge. This capacity can also be defined as the processes and routines that allow the new information or knowledge acquired to be analyzed, processed, interpreted, understood, internalized and classified.	Szulanski (1996), Zahra and George (2002)
Transformation	Transformation capacity is a firm's capacity to develop and refine the internal routines that facilitate the transference and combination of previous knowledge with the newly acquired or assimilated knowledge. Transformation may be achieved by adding or eliminating knowledge, or by interpreting and combining existing knowledge in a different, innovative way.	Kogut and Zander (1992), Van den Bosch <i>et al.</i> (1999)
Application	Application or exploitation capacity refers to the organizational capacity based on routines that enable firms to incorporate acquired, assimilated and transformed knowledge into their operations and routines not only to refine, perfect, expand and leverage existing routines, processes, competences and knowledge, but also to create new operations, competences, routines, goods and organizational forms.	Lane and Lubatkin (1998), Zahra and George (2002)

Source: Camisón and Forés (2010)

### 1.3. Antecedents of firm's absorptive capacity

Antecedents of companies' absorptive capacity have been treated by many authors, arguing the effect of different key variables on firm's ACAP. Cohen and Levinthal (1990) suggest that absorptive capacity development is a path-dependent process, which implies that prior related knowledge and experience about technical and infrastructure development process and tasks

condition the enhancement processes of absorptive capacity. Jansen et al. (2005) argued that cross-functional interfaces, participation in decision-making, and job rotation improve company's potential absorptive capacity on the one hand, and that connectedness and socialization tactics enhance firm's realized absorptive capacity on the other hand. Likewise, Fabrizio (2009) pointed out that the firms collaboration with universities and with scientists of the universities improve their absorptive capacities of knowledge, providing at the same time "advantage in terms of both the timing and quality of search outcomes". In a study aiming at exploring the implications of companies identification of their R&D approaches, Wiethaus (2005) argued that "identical broad R&D approaches 'connect' firms with their R&D environment and maximize absorptive capacities, the opposite holds for idiosyncratic R&D approaches".

In summary, absorptive capacity' enhancing constitutes the subject of an important amount of studies that broadly indicate several factors that may contribute to firm's absorptive capacity development. For example, prior knowledge (Cohen and Levinthal, 1990), combinative capabilities (Van den Bosch et al., 1999, Kogut and Zander, 1992) and adaptive capabilities of the companies, among other variables, have previously been appointed in the literature as antecedents of absorptive capacity. The following table 5 summarizes the results of many relevant studies in this subject.

Table 5: Antecedents of ACAP according to referential contributions

<b>Antecedents of absorptive capacity</b>	<b>Authors</b>
Investments in R&D and related activities.	Cohen and Levinthal (1990)
Trust and cultural compatibility between acquiring firm and source of knowledge.	Lane <i>et al.</i> (2001)
Cross-functional interfaces, job rotation, and socialization of tactics, connectedness, participation in decision-making processes.	Jansen <i>et al.</i> (2005)
Firm's basic research activities.	Rosenberg (1990), Lane and Lubatk (1998)
Routines of the firm.	Zahra and George (2002)
Identical broad R&D approaches maximize absorptive capacities, the opposite holds for idiosyncratic R&D approaches.	Wiethaus (2005)
Employees skills	Vinding (2006)
Technological commonality between the acquiring and origin companies or and the relatedness of their research.	Mowery <i>et al.</i> (1996)
Combinative capabilities	Kogut and Zander (1992)
Individuals' abilities and motivations	Lenox and King (2004)

Source: Compiled by author from different resources

Despite the increasing number of empirical researches (Zahra and George, 2002, Lichtenthaler, 2009, Volberda et al., 2010, Cohen and Levinthal, 1990), there is no common agreement about which internal and/or external variables may have major impacts on the development of companies' ACAP and vice-versa. In this logic, the following, insufficiently interactions are analyzed.

## 2. ACAP MAIN IMPLICATIONS/ OUTCOMES

### 2.1. Implications

In an advanced step towards deepening our understanding of the absorptive capacity, Volberda *et al.* (2010) performed a bibliometric study listing the main researches about absorptive capacity, their contributions, the used constructs, and the main implications they provide. His study encloses referential works published within the different theories such as learning, knowledge-based view of the firm, innovation, managerial cognition, dynamic capabilities and coevolution. It sheds light on the different implications and outcomes of ACAP, as shown in the following table 3.

Table 3: ACAP implications/ outcomes as reported by literature

Theories	Main contributions	Implications
Learning	Fiol and Lyles (1985) Levitt and March (1988) Cohen and Levinthal (1989, 1990) Lyles and Salk (1996) Lane and Lubatkin (1998) Lane et al. (2001) Reagans and McEvily (2003) Dhanaraj et al. (2004)	<ul style="list-style-type: none"> <li>• AC consists of three dimensions: recognition, assimilation, and exploitation.</li> <li>• (Inter) organizational context matters for ACAP.</li> <li>• Levels of analysis: individuals, organizations, dyads, and networks.</li> </ul>
Innovation	Kedia and Bhagat (1988) Cohen and Levinthal (1989, 1990) Cockburn and Henderson (1998) Feinberg and Gupta (2004) Rothaermel and Alexandre (2009) Benson and Ziedonis (2009)	<ul style="list-style-type: none"> <li>• ACAP influences innovative performance.</li> <li>• ACAP as by-product of R&amp;D.</li> <li>• Cultural differences between countries affect ACAP.</li> <li>• (Inter) organizational context matters for ACAP.</li> </ul>
Managerial Cognition	Bettis and Prahalad (1986, 1995) Lyles and Schwenk (1992) Calori et al. (1994) Dijksterhuis et al. (1999) Van den Bosch and Van Wijk (2001) Sanchez (2001) Lenox and King (2004) Minbaeva et al. (2003)	<ul style="list-style-type: none"> <li>• Management logics, through organizational forms, influence absorptive capacity, especially in complex environments.</li> <li>• Managers can develop ACAP by directly providing information.</li> <li>• Individuals' abilities as well as their motivations enhance ACAP.</li> </ul>
Knowledge-based view of the firm	Kogut and Zander (1992) Starbuck (1992) Garud and Nayyar (1994) Grant (1996a, b) Van den Bosch et al. (1999) Van Wijk et al. (2003) Foss and Pedersen (2004)	<ul style="list-style-type: none"> <li>• High ACAP increases the amount and productivity of knowledge.</li> <li>• Combinative capabilities, organizational form, and knowledge characteristics all influence the firm's ACAP.</li> <li>• ACAP is particularly relevant when</li> </ul>

	Andersen and Foss (2005) Malhotra et al. (2005) Matusik and Heeley (2005)	knowledge is shared.
Dynamic capabilities	Cohen and Levinthal (1994) Grant (1996b) Van den Bosch et al. (1999) Floyd and Lane (2000) Zahra and George (2002) Jansen et al. (2005) Lichtenthaler (2009)	<ul style="list-style-type: none"> <li>• ACAP is a high level capability, supported by other capabilities.</li> <li>• PACAP consists of knowledge acquisition and assimilation capabilities and is increased by coordination capabilities.</li> <li>• RACAP consists of knowledge transformation and exploitation capabilities and is increased by systems and socialization capabilities.</li> </ul>
Coevolution	Cohen and Levinthal (1994, 1997) Koza and Lewin (1999) Lewin et al. (1999) Lewin and Volberda (1999) Van den Bosch et al. (1999) Huygens et al. (2001) Volberda and Lewin (2003)	<ul style="list-style-type: none"> <li>• ACAP enables or restricts firm adaptation.</li> <li>• ACAP coevolves with the knowledge environment.</li> <li>• Levels and direction of ACAP are shaped by the joint effect of managerial actions and developments in the knowledge environment.</li> </ul>

Source: Volberda *et al.* (2010)

Although table 3 summarizes the most important effects of ACAP according to different approaches, the emphasis of knowledge and innovation is clear. Therefore, the imminent following points deal especially with the interactions among ACAP, learning and organizational innovation.

## 2.2. Absorptive capacity as a key success for innovation development

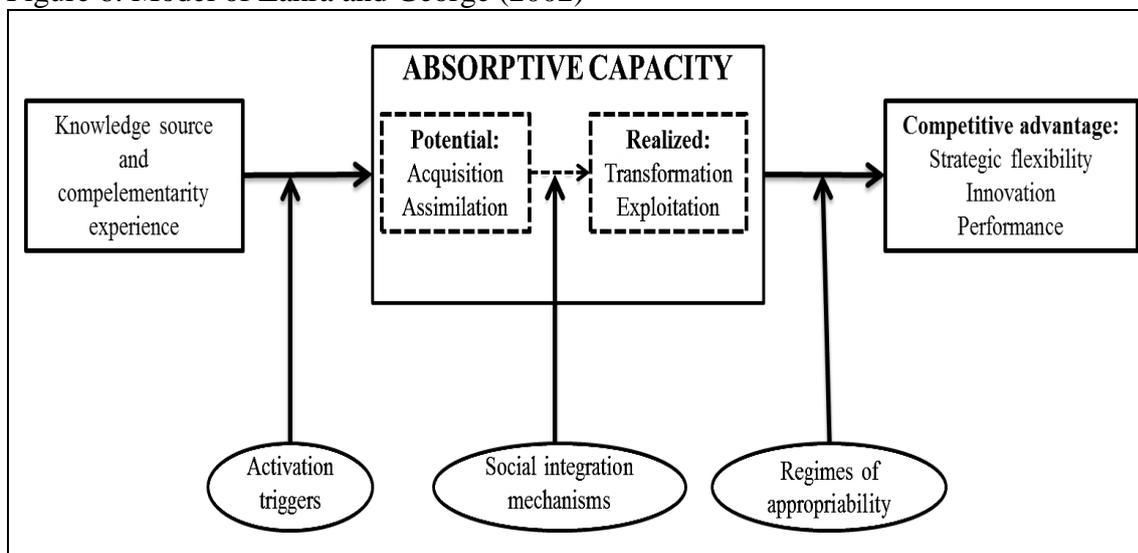
Innovation literature sustains that company's ACAP influences its innovate capability as well as the performance of innovation. For example Kedia and Bhagat (1988) point out that cultural differences between countries and nations affect ACAP, which, in turn, affects innovation capabilities and outcomes. Likewise, Cohen and Levinthal (1990) clearly state that absorptive capacity conditions companies' capability to innovate, and that R&D and ACAP interact with each other to increase a firm's knowledge base and innovation. Similar reasons offered by Cockburn and Henderson (1998) in their study conducted within the pharmaceutical context, who argue that firm's ability to acquire and use knowledge inside the firm itself, as well as its ability to integrate extramural knowledge affect its R&D productivity in terms of new patents. Likewise, Rothaermel and Alexandre (2009) that absorptive capacity of the company moderates the ambidexterity in technology sourcing, which means that involving concomitantly in exploitative and explorative activities for innovation aims, depends on the capability of the company to identify, assimilate, acquire and leverage external knowledge.

Studying this structure in a cross-cultural context and distinguishing between demand-pull and science-push absorptive capacities, Murovec and Prodan (2009) argue empirically that both kinds of absorptive capacity significantly and positively impact product and process

innovations. According to them, demand-pull ACAP bases on market information issued from sources such as suppliers, customers and competitors. Whereas science-push ACAP is rooted in the information obtained from scientific sources such as universities and commercial R&D companies. Although, their relatively new designation, in which they consider the sources of knowledge to be relevant, their empirical analysis shows no doubt about the positive effect of absorptive capacity on innovation outcomes.

Zahra and George (2002)'s widely-discussed model assumes a direct relationship and positive interaction amongst ACAP, innovation, flexibility and firm financial performance. Furthermore, according to them, the regimes of appropriability moderate such a relationship, which implies that the nature of technology to be acquired as well as the legal mechanisms of protection impacts and determines the scope of the rewards of absorptive capacity on innovation system, as shown in the following figure.

Figure 6: Model of Zahra and George (2002)



Source: Zahra and George (2002)

Empirical contributions dealing with the ACAP-innovation interaction increase recently. Kostopoulos *et al.* (2011) perform a longitudinal study, within the Greek market, arguing that ACAP contributes, directly and indirectly, to innovation and financial performance but in different time spans. Similarly, longitudinal case studies conducted by Gebauer *et al.* (2012) pointed out that ACAP conditions the re-conceptualization of business model, the creation of new markets as well as the creation of customer values. Also, in their study of Taiwanese manufacturing companies, Chen *et al.* (2009) argue that ACAP is an important determinant of firm performance through innovation enhancement.

Likewise, studying the Belgium traditional industries, Spithoven *et al.* (2011) argue empirically that absorptive capacity is a pre-condition of open innovation. Furthermore, they argue that the openness of innovation leads companies to strengthen their absorptive capacity. Similar reasons offered by Arbussa and Coenders (2007) who consider that the effect of ACAP on innovation activities depends on the industry itself, and that such a relationship is stronger in the case of firms investing in appropriation instruments. In a similar logic, Fosfuri and Tribó (2008), analyzing the antecedents of potential ACAP and the effect of the last on innovation, find that it is a significant source of a competitive advantage in innovation, especially with efficient knowledge internal flows. This means that, the efficient is the

internal leveraging on knowledge, the significant is the effect of the capacity of the company to identify and assimilate and acquire knowledge on innovation outcomes.

In sum, literature offers abundant empirical and theoretical contributions, claiming a direct and indirect relationship between ACAP and innovation development. The underlying assumption behind this relationship is rooted in the coevolution of knowledge management effectiveness and innovation development success. An idea that has been translated into several works claiming a direct relation between ACAP and innovation as previously indicated, and indirect relationship through knowledge management as in the works of Kogut and Zander (1992), Van den Bosch et al. (1999) and Cohen and Levinthal (1990) among others.

### **2.3. Absorptive capacity determines learning capability**

In today's rapidly changing environments, companies should know how to act appropriately and rapidly. The ability to respond to the surrounding challenges reflects the effectiveness of a firm's organizational responsiveness and pioneering (Garrett et al., 2009). Daft and Weick (1984) argued that the fundamental processes involving the "recognition and interpretation" of environmental changes influence organizational responsiveness to those changes. "Recognition and interpretation", in turn, reflects the main part of potential absorptive capacity, according to Zahra and George (2002).

The capacity of a company to acquire external knowledge is a determinant of knowledge renovation and reconfiguration, and thus performance (Tseng et al., 2011, Martínez-Cañas et al., 2012). Cohen and Levinthal (1990) argue that, in contrast with *learning-by-doing*, absorptive capacity allows companies to leverage external knowledge and then to learn how to do different things. Likewise, Zahra and George (2002) assess the role of internal exploitation of resources and capabilities as capability forming a part of ACAP. In addition, many researchers argue that enhancing potential absorptive capacity may lead to a renewal of the firm's knowledge (Jansen et al., 2005, Zahra and George, 2002). The renewal of a firm's stock of knowledge is the main target of exploration, which, according to March (1991), seeks diversification and new options. This is because exploration begins from the logic of creating new knowledge and strategic competences, and tends to invent new products or services with new tools and fresh organization (Molina-Castillo et al., 2011, Auh and Menguc, 2005).

Investigating the effects of exploration and exploitation in alliance formation, Lavie and Rosenkopf (2006) argued that absorptive capacity enhances exploration of externally held knowledge. Likely, Rosenkopf and Nerkar (2001) address similar idea, considering that absorptive capacity encourages entrepreneurship and the discovery of novelty. Although Rosenkopf and Nerkar (2001) explain the relationship between absorptive capacity and exploration as evidence of the implications of each and also the intersection between the effects of "having the ability to identify acquire and use external knowledge and the research of that knowledge", Lavie and Rosenkopf (2006) consider that higher absorptive capacity encourages firms to explore and seek new potential sources of knowledge.

Absorptive capacity is, widely seen as a result of self-enhancement through abundant and continuous engagement in research over time (Tu et al., 2006, Cohen and Levinthal, 1990). Hoang and Rothaermel (2010) argued that absorptive capacity grows through repeated exploratory activities. Furthermore, firms probably have a significant absorptive capacity when they assume a prospective strategy, which leads them to adopt an exploratory position.

In summary, the ability of a firm to transform and use acquired knowledge can be seen as a path-dependent experience, which is the essence of realized absorptive capacity. Thus, higher realized absorptive capacity may encourage firm to explore new alternatives efficiently.

### **3. MULTILEVELNESS, FUZZINESS AND THE RECONCEPTUALIZATION NEED**

#### **3.1. Multilevelness of absorptive capacity**

A review of the literature indicates that absorptive capacity is widely considered as multilevel. Yet, the major part of literature deals with firm-level absorptive capacity (e.g. Volberda et al., 2010, Hurley and Hult, 1998, Camisón and Forés, 2010, Cohen and Levinthal, 1990, Fabrizio, 2009, Fosfuri and Tribó, 2008, Jansen et al., 2005, Kostopoulos *et al.*, 2011, Lane et al., 2006, Poh-Lin, Winter 2009, Sun and Anderson, 2010, Todorova and Durisin, 2007, Zahra and George, 2002, Lenox and King, 2004, Lichtenthaler, 2009). These studies put more emphasis on the company itself as a unit of analysis: how it can strengthen its absorption capacity of external knowledge and leverage such knowledge.

Other studies analyze absorptive capacity on an inter-organizational level, highlighting the role of the other counterpart of knowledge absorption process within strategic alliances and joint ventures (e.g. Inkpen and Dinur, 1998, Lane and Lubatkin, 1998, Lane et al., 2001). The inter-organizational focus considers absorptive capacity as a dual process of mutual interaction between two or more companies, therefore both parts receive analytical attention (Luo, 2013). In this context, the focus is on the structure of communication between the receiver and the giver, or between the student and teacher companies according to (Lane and Lubatkin, 1998).

Likewise, absorptive capacity has been studied within the context of specific sectors (e.g. Boer *et al.*, 1999, Spithoven *et al.*, 2011, Chen *et al.*, 2009). The underlying idea behind this is that knowledge creation and diffusion depends on the industries nature, thus, absorptive capacity differs from a company to another according to its business sector. For example, technology-based and innovation-intensive industries are characterized by a high rate of knowledge creation and obsolescence due to the associated dynamism of these sectors, therefore, company's ability to leverage external knowledge is crucial for its survival and growth. In the case of traditional business models, a certain level of absorptive capacity can satisfy the needs and then the mechanisms and impacts of knowledge absorption differ from those of technological sectors.

Other authors consider the social and economic similarities between blocs of countries, analyzing absorptive capacity on a cluster level. European Union represents a vivid studied examples (e.g. Kneller and Stevens, 2006, Griffith et al., 2004). In a similar logic, cross-national and international level have been considered in the levelness of absorptive capacity study (e.g. Zahra and Hayton, 2008, Lane et al., 2001, Feeny and de Silva, 2012, Minbaeva et al., 2003, Murovec and Prodan, 2009).

On lower levels, business units (Tsai, 2001) form also a subject of analysis of absorptive capacity, as connectedness among units may impact the identification-leveraging process of knowledge existing in business environments. Likewise, on individual level (Vinding, 2006), companies may leverage human resources abilities to the same previously-indicated end. The

latter vision is aligned with Cohen and Levinthal (1990)'s vision, since the ability to evaluate and utilize external knowledge is conditioned by the level of prior related knowledge, including prior personal skills, shared language and technological and scientific awareness. A similar vision by Lenox and King (2004) emphasizes the "role managers play in administering information to organizational subunits".

In short, absorptive capacity has constitutes a fertile matter in business sciences thanks to the recognized importance of knowledge in today's markets and economy. It has been studied from different perspectives and on different levels such as nation, economy, industry, company, business unit, and individual considerations, which suggests the multi-levelness of the same. Herein, the focus is solely on the firm level.

### **3.2. Towards a new dynamic operationalization of ACAP**

The main recommendation of the widely-cited contribution of Zahra and George (2002) stresses that future studies should analyze the individual capabilities as well as the specific operationalization of ACAP capabilities. Consistent with this logic, the present contribution suggests a new conceptualization based on the locus of capabilities themselves, i.e. firm's different resources. A resource stands for "an asset or input to production (tangible or intangible) that an organization owns, controls, or has access to on a semi-permanent basis (Helfat and Peteraf, 2003: 999). firm resources includes brands, technological knowledge, skilled personnel, trade contacts, machinery, efficient procedures, capital...etc. (Wernerfelt, 1984). In other words, firm's resources are "all assets, capabilities, organizational processes, firm attributes, information, knowledge...etc." (Barney, 1991: 101). Resources can be either tangible (palpable, touchable, material) or intangible (impalpable, untouchable, immaterial). Tangible resources stand for the physical assets such as raw materials and facilities owned by a company, while intangible resources encompass: human capital, organizational capital, technological capital, and relational capital (Hall, 1992). According to him, human capital resources include all of the people-dependent, while relational capital consists of all people-independent. Value creation and flexibility represent strategically the main difference between tangible and intangible resources (Chatterjee and Wernerfelt, 1991).

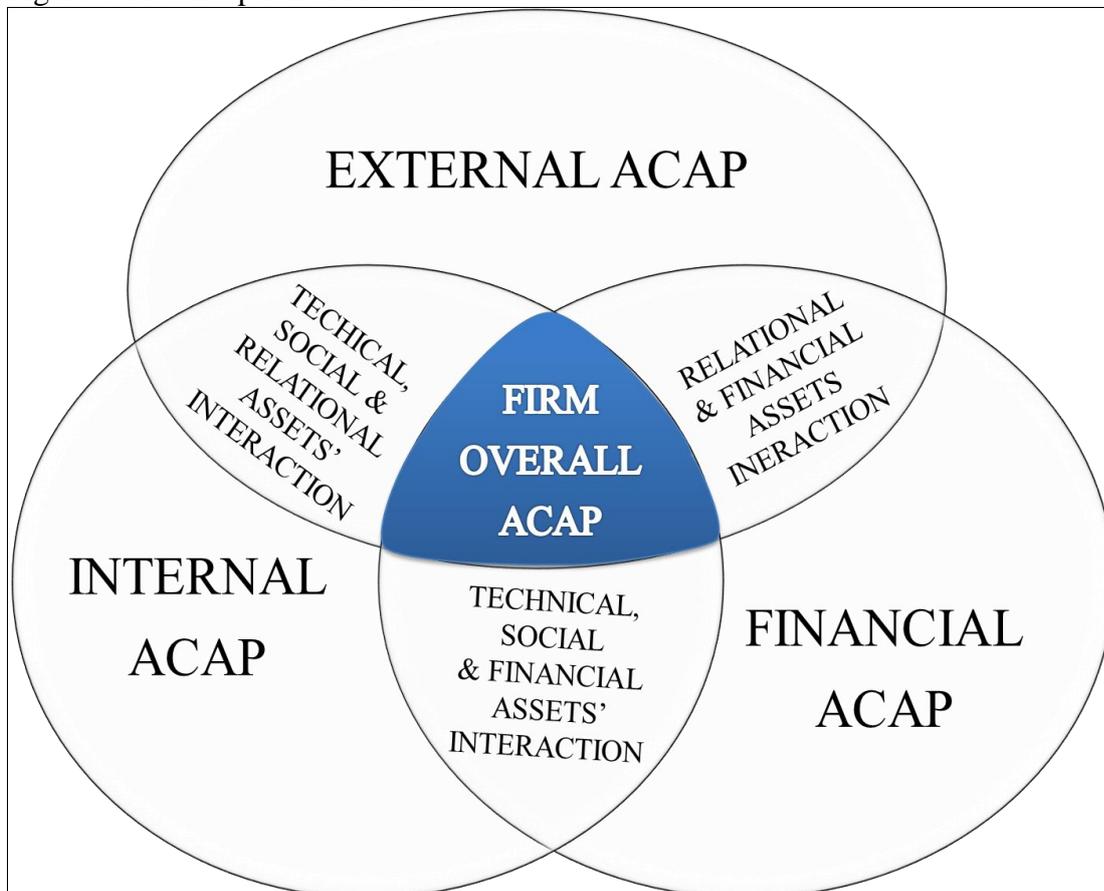
For purposes of this contribution, a different classification of firm resources is required. Resources can basically be technico-physical, social or financial. Technico-physical resources can manifest in palpable technology and physical assets, whereas social resources enclose the human resources in their wide manifestations. Financial resources contain all the financial assets. A company has three main blocks of resources: External (relational), potential (socio-technical) and financial resources. External resources are mainly rooted on one hand in contracts (R&D, commercial, acquisition) and on the other hand in the inter-industrial links, recruitments and so forth. Socio-technical resources are reflected in R&D, human resources, patents, stock of material and immaterial assets. The entanglement of firm's different resources may lead to a different classification seeking a suitable categorization that serves the main aim of the present contribution.

Table 7: Firm potential

Relational	Socio-technical	Finance
1-Contracts -R&D -Commercial (joint-venture...) -Acquisition -... 2) Relationships: -With authorities... -Inter-industrial -Recruitment -Supplier, customer...	1-R&D 2-Human resources 3-Patents, brand names and technological know-how -Physical (e.g. machinery, facilities...etc.) -Capabilities embedded in the business' culture, routines, processes,...etc.	1-Financial aspect (internal) 2-Mobilization of external capitals: -Bank -Stock market -Subsidiaries ...

I argue that a company may have a well-established socio-technical structure in a given moment without obviously having a parallel financial structure, and vice-versa. Or, it may have efficient external relationships with no-sufficiently-enough internal structure for acquiring knowledge. According to this logic the ACAP can be subdivided into three main subsets: internal (based on: social and technical), external (based on the external relations) and financial. Social resources and capability includes all the human, cultural and procedural aspects that may influence the capacity of a company to acquire external knowledge, while technical absorptive capacity reflects the technical capabilities that may be employed in the same end. Based on which, the following figure clarifies this issue.

Figure 8: A conception of ACAP



Firms work by means of internal and external resources and capabilities, based on which their heterogeneity is interpretable (Peteraf, 1993, Verona, 1999, Wernerfelt, 1984, Barney, 2001). Furthermore, these credentials determine their ability to leverage the information existing in their environments. In this sense, the ACAP of the company is then the sum of internal, external and financial capabilities to absorb and use external knowledge. These capabilities are resultant of socio-technical and financial reactions. The sub-ACAPs produced of these interactions determines the scope of firm's overall ACAP.

## **FUTURE RESEARCH LINES AND TENDENCIES**

Although this review sheds a new light on the most influential aspects of organizational absorptive capacity, it opens new tendencies towards potential subjects to be investigated. The most salient lines to be considered in future studies provoke the need of re-dimensionalize the ACAP construct on the bases on the resources the companies hold. Thus, ACAP perhaps should be operationalized considering its social, technical, financial constituents. This implies new measurements and scales that future empirical contributions may perform. Finally, the size of the companies may impact their ability to leverage extramural knowledge, which should be considered within future studies.

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