

## **Absorptive capacity: review and research agenda**

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**Abstract:** Absorptive capacity (ACAP) is one of the most valued concepts introduced in recent decades. This construct has been widely used and tested in different fields such as strategic management, knowledge management, open innovation and corporate entrepreneurship. Yet, there is less systematic review of the expanding body of knowledge on ACAP in recent years to aid us understand how and why this capacity can be utilised for organisational outputs. In this vein, this paper first reviews previous empirical studies on ACAP and provides an integrative model, synthesizing prior research. We then recognise under-investigated themes and provide suggestions for future research.

**Keywords:** Absorptive capacity, innovation, organisational outputs, Research and Development (R&D).

### **Introduction**

Absorptive capacity (ACAP) concerns a firm's capability to recognise the value of new external knowledge, assimilate and exploit it in its operations or for commercial purposes (Lane, Koka, & Pathak, 2006). In their seminal article, Cohen and Levinthal (1990) argue that some firms are able to value, understand and apply new external knowledge with less cost and effort than others, because they have already invested in cultivating their ACAP and prior related knowledge. Cohen and Levinthal (1989, p. 570) posit that "unlike learning-by-doing which allows firms to get better at what they already do, absorptive capacity allows firms to learn to do something different." Accordingly, they propose that ACAP can enhance innovative activities within established firms through both creating novel knowledge internally (via such activities as Resource and Development (R&D) investments) and making sense of new external knowledge and combining it with pre-existing knowledge.

Since the introduction of the absorptive capacity construct, scholars have attempted to clarify different aspects of this concept, its origins, organisational outputs and conditions under which it may influence organisational outputs. Yet, less attempt has been made to review and organise the literature. This provides the opportunity for this paper to systematically review prior research on ACAP and recognise under-investigated themes. We took several steps to do the critical literature review. It was first limited to empirical research on top journals. The keyword of absorptive capacity was used to search the articles as it is generally accepted as the dominant construct reflecting Cohen and Levinthal's (1990) conceptualisation. We identified the relevant articles from the Google Scholar database, spanning the period from 1989 (since when it was theorised by Cohen and Levinthal) till the end of 2015.

This paper can provide two important contributions to the ACAP literature. First, it categorises prior studies on conceptualisation, antecedents, outputs and moderators of ACAP – firm outputs link. Second and more importantly, we identified under-explored theoretical themes and provide avenues for future research. In the remainder of this section, we first

explain the method, then critically review the literature, synthesise it; and finally argue future research paths.

### **Method**

Following Shepherd, Williams and Patzelt (2015), criterion sampling was used based on keyword searches in top management and entrepreneurship journals such as *Academy of Management Journal*, *Academy of Management Review*, *Administrative Science Quarterly*, *Journal of Management*, *Journal of Management Studies*, *Management Science*, *Organization Science*, and *Strategic Management Journal*, *Journal of Business Venturing*, *Entrepreneurship Theory and Practice*, and *Strategic Entrepreneurship Journal*. The initial inventory included papers possessing the keyword of absorptive capacity in their title, abstract, or keywords, and spanning the period from 1989 till the end of 2015. As shown in Figure 1, we categorised the relevant papers into 4 main categories entailing 1) papers conceptualising ACAP, 2) outputs of ACAP, 3) moderators of the link between ACAP and outputs, and finally 4) antecedents of ACAP. Tables 1-3 present main prior studies included in the review and categorisation. The following sections critically review prior research within each of the identified categories and provide suggestions for future research

## **Literature review and findings**

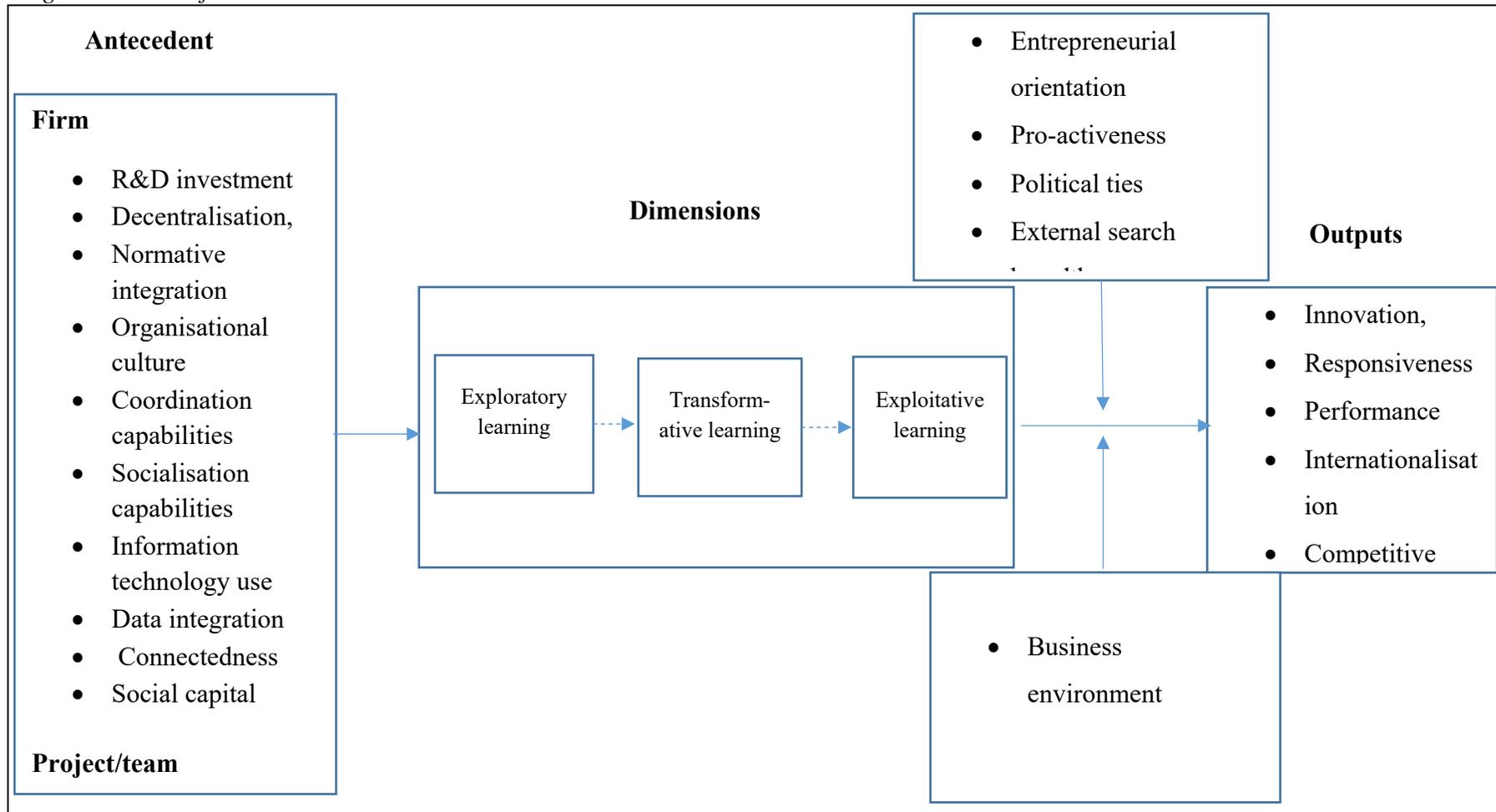
### **Absorptive capacity: conceptualisation and dimensionality**

ACAP was first introduced by Cohen and Levinthal (1989) in an article wherein it was posited that Research and Development (R&D) activities not only create new knowledge and innovation, but also improve a firm's ability to identify, assimilate, and exploit knowledge from external boundaries of the firm. They called this ability "learning" or "absorptive capacity." Although the term of ACAP had already been used by other scholars, such as Kedia and Bhagat (1988), the paper subsequently presented by Cohen and Levinthal (1990) is generally considered the foundation of the concept due to its theoretical contributions (Volberda et al., 2010).

Guided by perceptions from memory development and cognitive theories, Cohen and Levinthal (1990, p. 128) revised their initial definition (1989) by defining ACAP as "the ability of a firm to recognize the value of new, external information, assimilate it, and apply it to commercial ends". They state that this capability is essentially a function of a firm's prior related knowledge affecting its innovative capabilities. Based on insights from learning and cognitive theories, they first argue that memory development in human beings is self-reinforcing, and new knowledge is recorded into an individual's memory by creating connections with pre-existing concepts and knowledge. Therefore, the breath and differentiation of categories, as well as their

connections influence the understanding of new knowledge. This implies that a significant body of knowledge should be accumulated for making sense of more complex phenomena which means that absorptive capacity is path-dependent. Cohen and Levinthal (1990, p. 132) then posit that the concept of ACAP and the learning processes are also applicable at a firm level. However, it is not simply the sum of employees' ACAPs in the firm. They argue that "the structure of communication between the external environment and the organization," and among "the subunits of the organization" and "the character and distribution of expertise within the organization" influence a firm's ACAP. In summary, Cohen and Levinthal's core argument was that the main reason why some firms are able to value, understand, and apply new knowledge with less cost and effort than others is that they have already invested in cultivating their ACAP. They also consider ACAP as "an important part of a firm's ability to create new knowledge" (Cohen & Levinthal, 1989, p. 570).

Figure 1 Review framework



After the publication of Cohen & Levinthal's (1990) seminal article, scholars have endeavoured to revise the initial concept and provide different conceptualisations of absorptive capacity. A summary of different definitions and conceptualisations of ACAP is presented in Table 1. Heeley (1997), for example, decomposes ACAP into three distinct elements of external knowledge acquisition, intra-firm knowledge dissemination and technical competence. He contends that external knowledge acquisition and internal knowledge dissemination are respectively consistent with identification and assimilation functions, introduced by Cohen & Levinthal (1990). Technical competence, resulting mainly from Research and Development (R&D) activities, also reflects a firm's ability to exploit external knowledge. This capability impacts firms' ability to understand and assimilate new external knowledge. He suggests that these distinct elements provide a better and more accurate picture of a firm's absorptive capacity and also increase measurement opportunities (Heeley, 1997).

Lane and Lubatkin (1998) provided a re-conceptualisation of ACAP. They believe that previous definitions of ACAP imply that firms have equal capacity to gain knowledge and learn from all companies. They suggest that as knowledge is mostly embedded in the social context of a firm, a dyad and interactive learning approach should also be considered in inter-organisational learning. In other words, the relative attributes of the two firms determine a firm's ability to learn from another company. As such, considering ACAP in the strategic alliance context, Lane and Lubatkin (1998) introduce the term of relative ACAP as a learning dyad-level construct. They propose that the ability of a firm to learn from another firm is contingent on similarities in their knowledge bases, firm structures and compensation practices. Lane and Lubatkin (1998) emphasise that the first dimension of absorptive capacity, acquisition, largely depends on the similarity in scientific, technical and academic knowledge of the two firms. This reflects the know-what portion in their knowledge bases. The second dimension of ACAP, assimilation, is contingent on the resemblance of the two firms' knowledge processing displaying the know-how part in their knowledge bases. Finally the third dimension of ACAP, commercialisation, depends on similarities in their commercial goals which shows the know-why portion in their knowledge base.

An major reconceptualisation of the ACAP construct was published in the *Academy of Management Review* in 2002 by Zahra and George (2002). They argue that ACAP is embedded in organisational processes and routines through which firms acquire, assimilate, transform and apply external knowledge. They suggest two subsets of ACAP: potential ACAP encompassing knowledge acquisition and assimilation processes and realised ACAP comprising knowledge transformation and exploitation capabilities. Acquisition refers to "a firm's capability to identify and acquire externally generated knowledge that is critical to its operations." The assimilation dimension is defined as "the firm's routines and processes that allow it to analyse, process, interpret and understand the information obtained from external sources" (Zahra & George, 2002, p. 189). Transformation is defined as "a firm's capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge" (Zahra & George, 2002, p. 190). This can be achieved through adding or eliminating knowledge or interpreting the same knowledge in a different and innovative way. Eventually, exploitation concerns a company's ability to "refine, extend, and leverage existing competences or to create new ones by incorporating acquired and transformed knowledge into its operations" (Zahra & George, 2002, p. 189). The outcomes of exploitation can be the expanding of existing routines, new goods, systems, process, knowledge or new organisational forms.

*Table 1 Definitions and dimensions of absorptive capacity in literature*

<b>Authors</b>	<b>Definition</b>	<b>Dimension</b>	<b>Contribution</b>
Cohen and Levinthal (1989, 1990)	ACAP refers to a firm's ability to recognise the value of new, external information, assimilate it and apply it to commercial ends.	Recognition, assimilation, application	Introducing the concept in an organisational context
Heeley (1997)	ACAP includes external knowledge acquisition, internal knowledge dissemination and technical competence, residing essentially from prior research and development activities.	Acquisition, dissemination, technical competence	Decomposing ACAP construct into three distinct elements
Lane and Lubatkin (1998)	Relative ACAP, referring to the ability of a firm to learn from another firm, is contingent on similarities in knowledge bases, organizational structures and compensation practices and dominant logics of both firms.	Acquisition, dissemination, commercialisation	Introducing the concept of relative ACAP
Zahra and George (2002)	ACAP is a dynamic organizational capability encompassing organisational processes and routines, through which companies acquire, assimilate, transform and apply external knowledge.	Recognition, assimilation, transformation, exploitation	Introducing ACAP as a dynamic capability consisting of four dimensions.
Lane, Koka and Pathak (2006)	ACAP is a firm's capability to recognise potentially valuable new knowledge through exploratory learning, assimilate valuable new knowledge through transformative learning, and use the assimilated knowledge.	Recognition, assimilation through transformation, exploitation	Introducing a process-based definition of ACAP
Todorva and Durisin (2007)	ACAP is a firm's ability to recognise the value of external knowledge, acquire, assimilate or transform and exploit external knowledge.	Recognition, assimilation or transformation, exploitation	Introducing a new conceptualisation of ACAP
Biedenbach and Müller (2012); Tranekjer and Knudsen (2012)	ACAP is a firm's capability to benefit from external knowledge through exploratory, transformative and exploitative learning processes.	Recognition, assimilation, maintenance, reactivation, transmutation, application	Adding transformative learning to exploratory and exploitative learning processes.

Zahra and George (2002) contend that potential ACAP and realized ACAP play separate, yet complementary roles. This implies that the existence of either potential ACAP or realised ACAP in organizations does not necessarily result in innovation. A company may have the ability to acquire and assimilate external knowledge, and repeatedly renew its knowledge stock. However, it may not be able to exploit the assimilated knowledge by incorporating it into its operations. That way, the firm pays for knowledge acquisition without gaining from the investments. On the other hand, focusing on only transformation and exploitation may lead the firm to a “competence trap,” reducing the company’s ability to respond to environmental changes (Ahuja & Morris Lampert, 2001).

Zahra and George’s conceptualisation of ACAP was operationalised by Jansen, Van Den Bosch and Volberda (2005) exploring the impact of corporate mechanisms on the potential and realised components of absorptive capacity. They operationalised ACAP as a capability rather than using proxies (such as research and development investments or the number of educated employees) for measuring ACAP. They used a survey instrument, which seems to have become the dominant approach for measuring ACAP as an organisational capability.

Lane et al. (2006) also suggest a capability-based model of ACAP. They propose that ACAP is a company’s ability to make use of new external knowledge through three sequential processes: (1) the recognition and understanding of potentially valuable new knowledge through exploratory learning; (2) the assimilation of valuable new knowledge through transformative learning; and (3) the use of the assimilated knowledge to generate new knowledge and commercial outputs through exploitative learning. The main difference between this definition and Zahra and George’s (2002) conceptualisation is that in this model transformation is not a phase happening after assimilation, but new knowledge is assimilated by being combined with existing knowledge through transformative learning.

Todorova and Durisin (2007), however, questioned Zahra and George’s (2002) and Lane et al’s (2005) conceptualisation by defining ACAP as a firm’s ability to recognise the value of external knowledge, acquire, assimilate or transform, and exploit external knowledge. According to this definition, transformation is not a consequence of the assimilation step, but it can be considered as an alternative to assimilation. They point out that when there is a fit between new knowledge and existing cognitive schemes, new knowledge is assimilated and then directly exploited. Conversely, when new knowledge does not fit existing cognitive schemes, these structures should be alerted and modified to adapt to new knowledge and a situation which cannot be assimilated. Another difference between this definition and Zahra and George’s model is that they reintroduce the concept of recognising the value of external knowledge which was used in Cohen and Levinthal’s (1990) original conceptualisation, but disregarded by Zahra and George (2002). However, Todorova and Durisin’s (2007) conceptualisation has not been subject to empirical study to date.

Scholars have recently pointed to the importance of transformative capability as a complementary dimension of the exploratory and exploitative learning processes (Biedenbach & Müller, 2012; Garud & Nayyar, 1994; Kim, Akbar, Tzokas, & Al-Dajani, 2013; Schleimer & Pedersen, 2013; Tranekjer & Knudsen, 2012). This research stream argues that due to time lags in developing markets, complementary knowledge and technologies, companies may not be able to apply new assimilated knowledge for commercial purposes straight away. As such, firms should also be able to retain knowledge over time to finally reactivate it in appropriate time for innovative outputs. This learning process, which was first conceptualised by Garud and Nayyar (1994) as a firm’s transformative capability, links the exploratory and exploitative components. These learning processes are complementary and their effects on corporate innovative outputs depend on one another. These complementary processes altogether create a difficult-to-imitate capability and differentiate firms in their innovation performance.

### **Absorptive capacity and organisational outputs**

In their seminal article, Cohen and Levinthal (1990) argue that ACAP is the main part of a company for developing new knowledge. They suggest that this capability enhances innovative activities in firms through making sense of new external knowledge and learning to do different things. Prior studies have been devoted to investigating the impact of ACAP on corporate outcomes. A summary of these studies is presented in Table 2. Building on the knowledge-based view (Grant, 1996) and learning theories, a significant body of the literature posits that absorptive capability influences corporate outputs such as performance, innovation, responsiveness, internationalisation and competitive advantage through enriching knowledge bases in firms (Arbussa & Coenders, 2007; Chen, Lin, & Chang, 2009; Cohen & Levinthal, 1990; Domurath & Patzelt, 2015; Escribano et al., 2009; Gao, Xu, & Yang, 2008; George, Zahra, Wheatley, & Khan, 2001; Gray, 2006; Huang & Rice, 2009; Kim et al., 2013; Kostopoulos, Papalexandris, Papachroni, & Ioannou, 2011; Liao, Welsch, & Stoica, 2003; Liao, Fei, & Chen, 2007; McKelvie, Wiklund, & Short, 2007; Nieto & Quevedo, 2005; Zhou & Li, 2012; Wu & Voss, 2015).

### **Absorptive capacity and moderators**

Scholars have recently begun to understand mechanisms affecting the ACAP-corporate output relationships. Some examples of the studies investigating the factors moderating the impact of ACAP on corporate outputs are summarised in Table 3. Liao et al. (2003), for example, conclude that firms with a more proactive strategic orientation use their ACAP with more intensity. As such, pro-activeness positively moderates the relationship between ACAP and responsiveness. Wales, Parida and Patel (2013), in the same way, argue that strategic orientations such as innovativeness, risk-taking and pro-activeness through encouraging companies to capitalise on their knowledge-based discoveries enhance the association between ACAP and financial performance. They suggest that the relationship between a firm's ACAP and financial performance is non-linear, yet entrepreneurial orientation mitigates the reduction in corporate financial performance.

Scholars also argue the importance of the external knowledge search approach and pattern in more effective utilisation of ACAP. Laursen and Salter (2006, p. 134) define external knowledge search breadth as "the number of external sources or search channels that firms rely upon in their innovative activities." It is considered as a strategic approach for engaging more external knowledge sources in internal value-creation processes (Chesbrough, 2007; Drechsler & Natter, 2012; Laursen & Salter, 2006). Laursen and Salter (2006) argue that firms may miss opportunities due to lack of openness. Grimpe and Sofka (2009) also investigate the moderating effect of a firm's external knowledge search pattern in the relationship between ACAP and innovation success. They explain that in low technological sectors the impact of a firm's ACAP on innovation success is greater when firms adopt a search pattern targeting market knowledge from competitors and customers. In contrast, for companies in high technological sectors, a search pattern targeting technological knowledge from universities and suppliers amplifies the effect of ACAP on innovation success. Finally, the literature addresses the role of business environment in ACAP-firm output relationships. Liao et al. (2003), for instance, posit that that ACAP has more effect on a firm's responsiveness in more turbulent business environments. Kotabe Jiang, and Murray (2014) suggest networking with government officials as a complementary capability for firms in developing institutional contexts to generate better innovative performance from their ACAP. Tortoriello (2015) argues absorptive capacity at the individual level of analysis and concludes that an individual's position in the internal social structure moderates the link between external knowledge and the individual's innovativeness

*Table Error! No text of specified style in document. Example of prior studies on absorptive capacity's antecedents and outputs*

<b>Authors</b>	<b>Subject</b>	<b>Key results</b>	<b>Level</b>	<b>Measure</b>	<b>Dimensions</b>
George et al. (2001)	ACAP and innovation performance	ACAP positively affects innovation performance in biopharmaceutical firms.	Firm	R&D investments and the number of patents	Acquisition, assimilation, exploitation
Liao et al. (2003)	ACAP and responsiveness	ACAP increases a firm's responsiveness.	Firm	Scales measuring external knowledge acquisition and intra-firm dissemination	Acquisition, dissemination
Jansen et al. (2005)	Organisational mechanisms and ACAP	Organisational mechanisms related to coordination and socialisation capabilities differently affect potential and realised ACAP.	Firm	Scales measuring potential and realised ACAP	Acquisition, assimilation, transformation, exploitation
Gray (2006)	ACAP, growth orientation and performance	ACAP influences growth orientation, tendency to innovate and performance.	Firm	Levels of education, staff development	Acquisition, assimilation
Arbussa and Coenders (2007)	ACAP and innovative activities	The capability to scan the external environment and integrate new technology influences innovative activities.	Firm	External environment scanning and integrating external knowledge	Environment scanning, integration
Liao, Fei and Chen (2007)	Knowledge sharing, ACAP and innovation capability	ACAP mediates the relationship between knowledge sharing and innovation capacity, leading to competitive advantage.	Firm	Employee's ability and employee's motivation	Acquisition, dissemination, transformation, exploitation
McKelvie et al. (2007)	ACAP and innovation	All dimensions of ACAP affect innovation in new ventures.	Firm	Scales measuring four dimensions of ACAP	Acquisition, dissemination, transformation, exploitation

<b>Author</b>	<b>Subject</b>	<b>Key results</b>	<b>Level</b>	<b>Measure</b>	<b>Dimensions</b>
Gao, Xu and Yang (2008)	Managerial ties, ACAP and innovation	ACAP moderates the relationship between managerial ties and innovation.	Firm	R&D human capital	Acquisition, dissemination, transformation, exploitation
Kostopoulos et al. (2011)	ACAP, innovation, and financial performance	ACAP mediates the relationship between external knowledge flows and innovation performance, affecting performance.	Firm	R&D expenditures, training, level of education, R&D activities such as prototypes	Acquisition, dissemination, transformation, exploitation
Huang and Rice (2009)	ACAP and open innovation	ACAP moderates the negative effects networking and technology buy-in on innovation performance.	Firm	Training intensity	Acquisition, absorption
Chen, Lin and Chang (2009)	ACAP and innovation	ACAP influences innovation performance, resulting in competitive advantage.	Firm	Scales measuring four dimensions of ACAP such as the ability to apply external knowledge and invent new products	Acquisition, dissemination, transformation, exploitation
Escribano, Fosfuri and Tribo (2009)	External knowledge flows and ACAP	The relationship between involuntary external knowledge flows and innovation performance is moderated by ACAP.	Firm	R&D expenditures, a fully staffed R&D department, training, the ratio of scientists and researchers to total employees	Acquisition, assimilation, exploitation
Biedenbach and Müller (2012)	ACAP and performance	ACAP influences short- and long-term project performance and portfolio performance.	Firm	Scales measuring three dimensions of ACAP	Exploratory, transformative, exploitative learning
Kim et al. (2013)	ACAP and innovation.	ACAP mediates the relationship between systems thinking and innovation.	Firm	Scales measuring three dimensions of ACAP	Exploratory, transformative, exploitative learning

Hughes et al. (2014)	Social capital, ACAP, and innovative performance	Social capital through enhancing ACAP increases the firm's innovative performance.	Firm	Scales measuring ACAP	Sharing, interpreting, and assimilating routines
Ebers and Maurer (2014)	Relational embeddedness, empowerment and ACAP	Relational embeddedness and relational empowerment help firms build up their ACAP.	Project and Firm	Scales measuring ACAP	Potential and realised ACAP
Iyengar et al. (2015)	Information technology use and ACAP	Information technology use as a learning mechanism affects ACAP and performance.	Firm	Scales measuring ACAP	Acquisition, assimilation and utilisation as a single meta-construct.
Backmann et al. (2015)	Work-style similarity and knowledge complementarity and ACAP	Team ACAP is influenced by partners' work-style similarity and knowledge complementarity.	Team	Scales measuring ACAP	Acquisition, assimilation, transformation, exploitation
Wu and Voss (2015)	ACAP and international performance	ACAP affects international performance, in particular for early internationalisers.	Firm	Scales measuring ACAP	Integration and application
Huang et al. (2015)	R&D investment, ACAP and firm innovation.	R&D investment through developing ACAP affects firm innovation.	Firm	R&D employees	R&D employees as a proxy for potential and realised ACAP
Roberts (2015)	Data integration, connectedness, ACAP.	The interaction between data integration and connectedness influences ACAP.	Firm and unit	Scales measuring ACAP	Acquisition, assimilation, transformation, exploitation
Domurath and Patzelt, 2015	Social capital, ACAP, and international entry	Entrepreneurs' social capital in tandem with the venture's ACAP can enhance international entry.	Firm and individual	Scales measuring ACAP	Recognition, assimilation, exploitation

*Table Error! No text of specified style in document. Example of prior studies on the moderating impact of organisational and environmental factors on the absorptive capacity-corporate output relationships*

Authors	Key results	Level	Measure
Liao et al. (2003)	ACAP increases responsiveness, and the relationship is moderated by pro-activeness and environmental turbulence.	Firm	Scales measuring external knowledge acquisition and intra-firm dissemination
Laursen and Salter (2006)	Absorptive capacity and external search breadth are complementary in shaping innovative performance.	Firm	R&D investments
Grimpe and Sofka (2009)	External search pattern moderates the relationship between absorptive capacity and innovation success.	Firm	R&D investments
Wales et al. (2013)	Entrepreneurial orientation mitigates the reducing impact of absorptive capacity on financial performance.	Firm	Scales measuring absorptive capacity
Kotabe et al. (2014)	Networking with government officials enhances the impact of ACAP on innovative performance	Firm	Scales measuring absorptive capacity
Tortoriello (2015)	An individual's position in the internal social structure moderates the link between external knowledge and the individual's innovativeness	Individual	Scales measuring absorptive capacity

### **Absorptive capacity and antecedents**

The literature review reveals that little, yet increasing, theoretical and empirical attention has been given to the origins and causes of ACAP. In a recent attempt, Iyengar, Sweeney, and Montealegre (2015) indicate that information technology use as a learning mechanism affects ACAP and franchisee performance. Huang, Lin, Wu, and Yu (2015) tests Cohen and Levinthal's (1990) proposition and conclude that R&D investment through developing ACAP influences firm innovation. Adopting a team level of analysis, Backmann, Hoegl and Cordery (2015) argue that team ACAP is affected by partners' work-style similarity and knowledge complementarity. Roberts (2015) concludes that the interaction between data integration and connectedness promotes ACAP. Hughes, Morgan, Ireland, and Hughes (2014) show that social capital through enhancing ACAP increases the firm's innovative performance. Similarly, Ebers and Maurer (2014) conclude that relational embeddedness and relational empowerment help firms build up their ACAP. Schleimer and Pedersen (2013) also show that organisational mechanisms such as decentralisation, normative integration and innovative organisational culture increase ACAP in multinational corporation subsidiaries. Jansen et al. (2005) differentiate the antecedent of potential and realised ACAP and conclude that organizational mechanisms related to coordination capabilities (cross-functional interfaces,

participation in decision making, and job rotation) and socialisation capabilities (connectedness and socialization tactics) affect potential and realised ACAP respectively.

## **Discussion and suggestions for future research**

The critical literature review uncovers that despite significant insights provided by prior research, there are missing links in the literature and future empirical studies on ACAP need to address the following research avenues.

### **Need for more capability-oriented measures**

The investigation of the related literature indicates that since the introduction of the ACAP construct, scholars have attempted to clarify different aspects of this concept. Two important approaches have been taken to this construct. Some researchers have considered ACAP as a static resource in firms and used R&D investments, the number of patents and educated persons as proxies for ACAP (e.g., Escribano, Fosfuri, & Tribó, 2009; Huang & Rice, 2009). Examples of these studies are presented in Table 2. This approach, however, has been lately challenged by a second group of researchers, who take a capability-based approach (Biedenbach & Müller, 2012; Flatten, Engelen, Zahra, & Brettel, 2011; Lane et al., 2006; Lewin, Massini, & Peeters, 2011; Todorova & Durisin, 2007; Zahra & George, 2002). This latter group contends that proxies consider ACAP as a static resource in companies rather than a capability (Lane et al., 2006). Moreover, these proxies do not reflect the complexity of this capability's dimensions and the content of knowledge (Coombs & Bierly, 2006; Flatten et al., 2011). They also limit ACAP to specific contexts or industries (Lane et al., 2006; Lewin et al., 2011). More importantly, considering ACAP as a capability and a higher order resource seems to be more consistent with the resource-based view suggesting that superior performance mainly originates from higher order resources which are difficult to obtain and imitate, and built over time (Makadok, 2001). The latter stream essentially considers ACAP as a capability embedded in firms' routines and processes for acquisition, assimilation and exploitation of new external knowledge. Accordingly, future research should use more capability-oriented measures to more accurately operationalise this capability.

### **Need for contextualisation**

Recent studies on ACAP have guided attention to the broader institutional context where a firm attempts to realize its potentials in achieving better entrepreneurial performance (Kotabe, et al., 2014; Escribano, Fosfuri, & Tribó, 2009). Scholars have lately argued that a firm's ability to utilise its ACAP for entrepreneurial activities depends on the extent to which companies are exposed to new external knowledge (Qian & Acs, 2013; Zahra & George, 2002). Firms operating in contexts with less institutional development have limited access to new external knowledge due to institutional voids such as weak intellectual property rights and undeveloped supporting systems (Drechsler & Natter, 2012; Zhao, 2006). As such, their absorptive capacity can be underutilised (cf. Kotabe et al., 2014; Wales, Parida, & Patel, 2013). Yet, this assumption has not validated through cross-country empirical research. More importantly, less is known about how firms in less developed intuitional contexts can circumvent the intuitional voids to more effectively utilise their ACAP for CE. In a recent attempt, Kotabe et al. (2014) suggest networking with government officials as a complementary capability for firms in developing institutional contexts to generate better innovative performance from their ACAP. The literature; however, is still in its infancy and more research is needed to contextualise the impact of ACAP on organisational outputs.

### **Need for more entrepreneurial outputs**

Despite strong support for ACAP leading to innovative outcomes (Tsai, 2001) scholars have repeatedly pointed out that ACAP as a social capability has a path-dependent nature (Lane et al., 2006; Volberda et al., 2010). Over time such knowledge absorption capabilities may

increasingly focus on improving existing activities rather than driving more valuable entrepreneurial initiatives such as break-through innovation, entering new markets or developing new systems. In a critical literature review, Lane et al. (2006) argue that prior research on ACAP has mainly addressed the effect of ACAP on incremental innovation, and less attention has been paid to how this capability can be deployed for more innovative outputs. The attention-based view (Ocasio, 1997; 2011) suggests that capabilities should be channelled towards intended organisational outputs. Van de Ven (1986: 591) points out that ‘organisations are largely designed to focus on, harvest, and protect existing practices rather than pay attention to developing new ideas.’ Hence attention management, concerning the allocation of corporate efforts and capabilities to entrepreneurial versus ongoing activities, is an essential step in enhancing corporate entrepreneurial outputs. Accordingly, it appears that ACAP in tandem with some organisational channelling mechanisms can be driven towards more innovative initiatives, which is an interesting avenue for future research.

### **Need for more ACAP-development research**

As the literature review shows that there are very few studies theorising where ACAP comes from. ACAP has been defined as dynamic capability in the literature (Zahra & Goerge, 2002; Lane et al., 2006). Dynamic capabilities are defined as "the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environment" (Teece, Pisano, & Shuen, 1997, p.516). In this definition, organizational competences refers to organizational processes and routines (Teece, Pisano, & Shuen, 1997, p.518), or “regular and predictable patterns of activity which are made up of a sequence of coordinated actions by individuals” (Grant, 1996). This is in line with more recent conceptualisation of ACAP (Lane et al., 2006). The main function of dynamic capabilities is the modification of the firm’s resource/knowledge base, including its “zero-level” capabilities (Winter, 2003). From a dynamic capability view, organisational factors such as strategic orientations can affect the development of dynamic capabilities (Helfat & Peteraf, 2003; Ambrosini & Bowman, 2009). According to Wang and Ahmed (2007), the development of dynamic capabilities is guided by the firm’s strategic orientations. For example, a firm with a strategic orientation valuing differentiation builds up capabilities to increase the number of innovative products and services, while a firm with cost leadership strategy may provoke efficient manufacturing and reducing cost capabilities (Wang & Ahmed, 2007). Thus, future research can investigate how firms can build up their ACAP over time through such organisational mechanisms as entrepreneurial strategic orientations. In particular, as Jansen and his colleagues’ (2005) study indicates different dimensions of ACAP may have different causes and antecedents. Theorising how organisational mechanisms may affect different aspects of ACAP can also be a compelling path for future research.

Finally, researchers have recently studied ACAP at new levels of analysis. Backmann, et al. (2015), for example, posit partners' work-style similarity and knowledge complementarity can foster team ACAP. The literature of ACAP lacks insights into the way individual, team, firm and environmental factors may aid and trigger firms to develop their ACAP, which can be addressed by future studies.

To conclude, our literature review indicates that the literature of ACAP need to provide more capability-oriented of ACAP. Moreover, less is known about how and why the effectiveness of ACAP can be subject to the intuitional context where a firm is operating and the way firms can more effectively utilise such capability in different institutional contexts. Utilising complementary mechanisms to channel ACAP towards more innovative outputs is also a potentially valuable path for future research. Finally, more research need to advance our understanding of the origins and causes of ACAP and how firms can develop their ACAP

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