



Absorptive capacity and performance: The role of customer relationship and technological capabilities in high-tech SMEs



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ABSTRACT

This study focuses on how the interplay between a firm's absorptive capacity (ACAP), and its technological and customer relationship capability contributes to its overall performance. Using structural equation modeling in a sample of 158 firms (316 questionnaires, two respondents per firm) from South Korea's semiconductor industry, we find that a firm's ACAP leads to better performance in terms of new product development, market performance and profitability when used in combination with the firm's capability to engage state of the art technologies in its new product development program (NPD) (technological capability) as well as cultivate strong customer relationships to gain customer insight in NPD (customer relationship capability). By highlighting the interactive nature of absorptive capacity's antecedents and how these relate to firms' performance, this study contributes to the understanding of the role of ACAP as a mechanism for translating external knowledge into tangible benefits in high-tech SMEs, thus leading to important theoretical and practical implications.

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1. Introduction

In today's knowledge-intensive business environment, it is imperative for firms to acquire and use external knowledge to advance innovation and enhance performance (Abecassis Moedas & Mahmoud Jouini, 2008; Lane, Salk, & Lyles, 2001). *Easy to say, hard to put into practice.* The journey from the acquisition of knowledge to its productive use is not easy and many firms struggle (Hull & Covin, 2010; McGrath, 2001), especially those working in high-technology industries (Rothaermel & Deeds, 2004; Smith, Collins, & Clark, 2005). To address this, firms need to develop their absorptive capacity (ACAP) (Cohen & Levinthal, 1989, 1990), a notion that is increasingly being recognized as a source of competitive advantage (Jansen, Van den Bosch, & Volberda, 2005; Tu, Vonderembse, Ragu Nathan, & Sharkey, 2006; Zahra & George, 2002). ACAP is the firm's ability to utilize externally held knowledge through three processes of exploratory learning, transformative learning and exploitative learning (Lane, Koka, & Pathak, 2006).

Realizing that firms vary in the successful utilization of knowledge (Cassiman & Veugelers, 2006; Escribano, Fosfuri, & Tribó, 2009), scholars have urged for more research to elucidate the character, antecedents/determinants and outcomes of ACAP (Lane et al., 2006;

Todorova & Durisin, 2007; Zahra & George, 2002). Recent calls have directed attention to integrated approaches whereby ACAP is perceived not in a vacuum but within the wider context of a firm's effort to develop and commercialize innovations (for example, Cepeda Carrion, Cegarra Navarro, & Jimenez Jimenez, 2012; Fernhaber & Patel, 2012; Kostopoulos, Papalexandris, Papachroni, & Ioannou, 2010; Vega Jurado, Gutiérrez Gracia, & Fernández de Lucio, 2008; Volberda, Foss, & Lyles, 2010; Zhou & Wu, 2010). Embracing such an integrated approach and drawing lessons from a marketing management perspective, the recipe for competitive success in the development and commercialization of new products is best reflected, among other things, in a balanced attention to the technological and customer related aspects emerging in the innovation or new product development (NPD) process (Baker & Sinkula, 1999; Cooper & Kleinschmidt, 1995; Morgan, Vorhies, & Mason, 2009). To achieve this, firms invest heavily in acquiring, among other things, two seemingly distinct but inextricably linked capabilities: first, technological capability (TC) which allows firms to perform technical functions, such as R&D through the use of state of the art technologies thus producing technologically superior products (Teece, Pisano, & Shuen, 1997). Secondly, customer relationship management capability (CRC) which, allows firms to create strong customer relationships enabling customer insight and customer focus in the new product development activity (Day, 2002).

Thus, it may seem reasonable to assume that innovation performance is associated with organizational contexts where there is synergy amongst the ACAP of the firm and its TC and CRC. Or in practical terms, it

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is logical to assume that the more a firm has a clear ability to produce technologically superior products (TC) while capitalizing on a deep understanding of its customer base (CRC), the higher will be its capacity to explore, integrate and exploit (ACAP) external knowledge, and by implication the better its product, market and financial performance will be.

However, to the best of our knowledge, the relationship between a firm's technological and customer relationship capabilities and ACAP, and their synergistic effect upon performance, is yet to be tested empirically. Studies which link capabilities with ACAP have focused on IT capabilities (Liu, Ke, Wei, & Hua, 2013), knowledge creation capabilities (Su, Ahlstrom, Li, & Cheng, 2013), or political networking capabilities (Kotabe, Jiang, & Murray, 2014). Zhou and Wu (2010) show that while TC fosters exploitation, high level of such capability impedes explorative innovation, whereas Afuah (2002) suggests a positive relationship between TC and exploration. Thus, we still lack an understanding of the relationship between TC and ACAP, and indeed CRC and ACAP where we also struggled to find a study. In the absence of a systematic, empirical testing of these relationships, we cannot be confident about how TC and CRC affect ACAP and synergistically contribute to organizational performance. This gap needs to be addressed because a firm's technological and customer relationship capabilities are becoming crucial to produce new products and services in order to respond to the dynamic market needs (see Handfield & Bechtel, 2002; Hsieh & Tsai, 2007).

The other end of the successful application of ACAP is organizational performance (Escribano et al., 2009). Given that ACAP is a resource consuming process, to provide further credence to the role it plays in extracting value from a firm's resources (Camisón & Forés, 2010; Escribano et al., 2009), more evidence is needed on ACAP's relationship with a firm's performance (Kostopoulos et al., 2010), especially in the context of high-technology industries. Our paper addresses this level by researching these issues in a sample of SMEs from the South Korean semiconductor industry.

The following section provides the theoretical background and relevant literature support for our hypotheses. After that we explain the research methods employed to address these hypotheses and we conclude with a discussion of the study's results and associated theoretical and managerial implications.

2. Theoretical background and hypotheses

2.1. Absorptive capacity

Firms are confronting an ever changing and increasingly complex environment (Grant, 1996; O'Connor, 2008). ACAP enables firms to better respond and persist in such dynamic complexity (Cohen & Levinthal, 1989, 1990). It acts as a funneling or screening mechanism to productively utilize external knowledge for organizational advantage (Lane & Lubatkin, 1998; Zahra & George, 2002). This utilization involves a pathway from the identification and acquisition of external knowledge (exploratory learning), through its assimilation, understanding and retention (transformative learning) to its transmutation and application (exploitative learning) (Lane et al., 2006). While there are other ACAP frameworks available (e.g. Zahra & George, 2002), we use Lane et al.'s (2006) framework because its focus on exploration as well as exploitation and the combination of the two through transformative learning is particularly useful in the context of organizations that promote new innovations and new products/services (see Gebauer, Worch, & Truffer, 2012), such as the SMEs that we focused on.

In exploratory learning, firms capitalize on the available knowledge (Jansen et al., 2005; Lane et al., 2006). Exploratory learning requires firms to continuously scan the environment to identify and collect industry information, observe technological trends and identify sources of new knowledge. This exploratory search enables organizations to expand their horizon and acquire new knowledge from external

sources. However, knowledge acquisition is a necessary, but not sufficient condition for knowledge application (McGrath, 2001). In the context of problem solving competence, Atuahene Gima and Wei (2011) argue that the mere generation of market knowledge will not affect new product performance unless project members have the ability to apply and use knowledge (Cassiman & Veugelers, 2006; Daft & Weick, 1984).

However, the pathway from the exploration of knowledge to its application requires knowledge to be analyzed, understood and retained (Argote, McEvily, & Reagans, 2003; Garud & Nayyar, 1994). This is achieved through transformative learning (Lichtenthaler, 2009). For this, organizations need to be proficient in quickly understanding and absorbing knowledge (see Brown & Duguid, 1991). The knowledge that the firm assimilates in this process needs to be carefully stored and managed (March, 1991) as well as reactivated (Marsh & Stock, 2006) for later use and exploitation (Lane et al., 2006). Critical to this reactivation is a well functioning knowledge management system (Iske & Boekhoff, 2002). Moreover, in the current dynamic environment (Theodosiou, Kehagias, & Katsikea, 2012), time is a critical element. Firms, therefore, need to constantly analyze and interpret changing market demands and quickly understand new opportunities in order to translate these into competitive products.

Finally, knowledge application and use requires firms to be proficient in translating knowledge into new products and services. Exploitative learning of ACAP captures this translation process (Lane et al., 2006) through the transmutation of knowledge assimilated earlier and its subsequent application (Lichtenthaler, 2009). This translation is a dynamic rather than static process, involving frequent interactions within and outside the organization (Molina Morales & Martínez Fernández, 2010) where firms share expertise and capabilities, and subsequently improve and refine knowledge. Firms in this process require receptivity to new ideas (Tajeddini & Trueman, 2008) to regularly apply new knowledge in new products. Firms are also required to continuously learn (Lane et al., 2006) from their experiences and those of others to exploit knowledge better. Since learning is a self reinforcing process of knowledge creation (Akbar, 2003; Glazer, 1991), it makes it easier for firms to implement new knowledge. As such ACAP increases the speed at which firms can innovate (Lane et al., 2006).

2.2. Technological capability, absorptive capacity and performance

Technological capability is the ability to perform any relevant technical function or volume activity within the firm including the ability to develop new products and processes, and to operate facilities effectively (Teece et al., 1997). Technological capability is becoming extremely important because responding to dynamic market needs requires the development of new products that are increasingly nested in new technologies (Hsieh & Tsai, 2007) and such technologies change very rapidly (Handfield & Bechtel, 2002), thereby necessitating firms to keep abreast with this technological change. Firms with well developed technological capabilities tend to be high performing (Lavie, Kang, & Rosenkopf, 2011; McEvily, Eisenhardt, & Prescott, 2004) because mastering state of the art technologies allows them to pioneer in process innovations leading to competitive advantage through efficiency gains (Teece et al., 1997). They are also more innovative (Afuah, 2002) and can achieve higher differentiation by innovating products in response to the changing market environment (Teece & Pisano, 1994; Verona, 1999).

Technological capability relates to ACAP's exploratory, transformative and exploitative learning (Liu et al., 2013; Zhou & Wu, 2010). Developing a firm's technological capability requires investments in R&D which helps in the exploration of new innovations (Afuah, 2002). When a firm develops its technological capability, it is more likely to be receptive to new external information (Berkhout, Hartmann, & Trott, 2010). This receptivity further increases the ability of the firm to identify new technological developments and trends as a reinforcing

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