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## Absorptive capacity, organizational antecedents, and environmental dynamism

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## ABSTRACT

I examine organizational antecedents to absorptive capacity. Specifically, I identify and empirically test how the interaction between data integration and connectedness affects absorptive capacity. I also integrate the role of the environment in my research model by determining whether the link between these organizational capabilities and absorptive capacity varies across different levels of environmental dynamism. I test my model with data collected from 178 high-tech firms. The results show that data integration and connectedness jointly influence absorptive capacity; however, connectedness does not contribute to absorptive capacity above and beyond data integration for firms competing in dynamic environments. This study has implications for research and practice on absorptive capacity and organizational learning.

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## 1. Introduction

As firms face heightened levels of competition, globalization, and pressures to innovate, absorptive capacity is considered to be key to a firm's competitive advantage and survival (Lane, Koka, & Pathak, 2006; Zahra & George, 2002). Absorptive capacity is a firm's ability to identify, assimilate, and apply valuable external knowledge (Cohen & Levinthal, 1990). Although empirical research shows that absorptive capacity is positively linked to innovation and firm performance (Cohen & Levinthal, 1990; Kostopoulos, Papalexandris, Papachroni, & Ioannou, 2011; Tsai, 2001), antecedents such as organizational structure, processes, and capabilities have been largely omitted in the absorptive capacity literature (Lane et al., 2006). Even when organizational antecedents have been considered (Jansen, Bosch, & Volberda, 2005), they have usually been considered in isolation from each other. This is surprising given the widely held proposition that the many formal and informal structures and processes that make up an organization's design affect one another (Khandwalla, 1973; Nadler & Tushman, 1983).

Leveraging prior work on organizational capabilities and absorptive capacity (Jansen et al., 2005; Kogut & Zander, 1992; Van den Bosch, Volberda, & Boer, 1999), I examine the joint effects of data integration and connectedness on absorptive capacity. Data integration refers to the extent to which a firm's information systems provide access to integrated data (Bharadwaj, Bharadwaj, & Bendoly, 2007). As an organizational capability, data integration provides seamless and consistent access to a firm's knowledge base (i.e., what the firm knows regarding customers, markets, emerging technologies). In doing so, data integration makes it easier for organizational members to identify, assimilate,

and apply valuable external knowledge toward opportunities for innovation and competitive action (Roberts, Galluch, Dinger, & Grover, 2012). Yet although data integration may influence a firm's ability to absorb knowledge, firms often create greater value when they combine data integration capabilities with complementary organizational capabilities (Bharadwaj et al., 2007; Tanriverdi, 2006). Connectedness is one such capability. Connectedness refers to the degree of formal and informal direct contact among organizational members across departments (Jaworski & Kohli, 1993). Empirical studies show that connectedness directly enhances knowledge assimilation and application (Jansen et al., 2005). When combined with connectedness, data integration should facilitate knowledge exchange and shared understanding, thereby enhancing a firm's absorptive capacity.

While data integration and connectedness may jointly affect absorptive capacity, the environment also plays a significant role in the development of a firm's absorptive capacity (Lane et al., 2006; Van den Bosch et al., 1999; Volberda, Foss, & Lyles, 2010). For example, firms competing in stable environments will often develop absorptive capacity processes that facilitate incremental innovation, and firms competing in dynamic environments will usually develop absorptive capacity processes that promote radical innovation (Lavie, Stettner, & Tushman, 2010; Levinthal & March, 1993). If environmental dynamism influences the type of absorptive capacity a firm wishes to develop, the extent to which data integration and connectedness jointly influence absorptive capacity may depend upon certain environmental conditions. Hence, it is important to take environmental factors into account when investigating the link between organizational capabilities and absorptive capacity.

My objective is to address these issues and to contribute to existing research in two ways. First, I further our understanding of the nomological network surrounding organizational capabilities and absorptive capacity (Jansen et al., 2005; Van den Bosch et al., 1999; Volberda et al., 2010).

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I conceptually identify and empirically examine how the interaction between data integration and connectedness affects absorptive capacity. Second, I integrate the role of the environment into the aforementioned nomological network. Specifically, I investigate whether the link between organizational capabilities and absorptive capacity varies across different levels of environmental dynamism.

This manuscript proceeds as follows. I first describe my theoretical foundations and research model. Second, I develop arguments for my hypotheses. I then detail the design and execution of an empirical study that tests my research hypotheses. Finally, I discuss my findings, study limitations, and implications for research and practice.

## 2. Theory and hypotheses

I adopt Lane et al.'s (2006) theoretical framework of absorptive capacity as a starting point for my research model. Within this framework, absorptive capacity is defined as a firm's ability to recognize and understand new external knowledge, assimilate valuable external knowledge, and apply assimilated external knowledge. Lane et al. suggest a number of high-level antecedents to absorptive capacity, e.g., internal knowledge resources, learning relationships, organizational capabilities, and firm strategy. Given the wide range of concepts in Lane et al.'s framework, I focus my analysis on organizational capabilities, which are defined as high-level routines (or collection of routines) that confer upon an organization's management a set of decision options for producing significant outputs of a particular type (Winter, 2003). Furthermore, I examine two types of organizational capabilities — *systems capabilities* and *socialization capabilities*. Systems capabilities program behaviors in advance of their execution and offer a memory for handling routine situations, and socialization capabilities create broad, tacitly understood rules for appropriate action (Galbraith, 1973; Jansen et al., 2005; Van den Bosch et al., 1999).

I conceptualize *data integration* as a systems capability and *connectedness* as a socialization capability. Data integration is defined as the extent to which a firm's information systems provide access to integrated data (Bharadwaj et al., 2007). Connectedness is defined as the degree of formal and informal direct contact among organizational members across departments (Jaworski & Kohli, 1993). I first hypothesize data integration's direct effect on absorptive capacity. I then posit an interaction effect: namely, connectedness will moderate the relationship between data integration and absorptive capacity. Finally, Lane et al. posit that environmental conditions play a role in the development of a firm's absorptive capacity. Firms develop certain types of absorptive capacity processes depending on the environment they operate in (Van den Bosch et al., 1999). Thus, I include environmental dynamism in my model. Specifically, I posit a three-way interaction such that absorptive capacity is highest when data integration and connectedness are high, and environmental dynamism is low. Fig. 1 depicts my research model. I discuss my constructs and their relationships in greater detail as I develop my hypotheses.

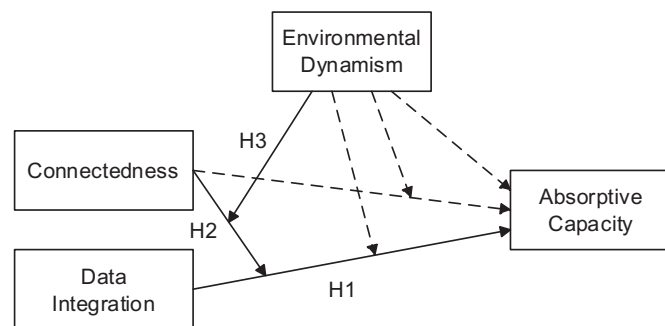


Fig. 1. Research model. Full arrows indicate hypotheses. Dashed arrows indicate effects included as controls.

### 2.1. Data integration and absorptive capacity

Several integration-related constructs have appeared in absorptive capacity research. Thus, I first distinguish my study from related work to help further motivate my present effort. First, data integration focuses on an organization's ability to access data stored in its information systems. Thus, it is distinct from higher-level constructs such as overall knowledge integration (Iansiti & Clark, 1994), network position (Tsai, 2001), knowledge management capability (Tanriverdi, 2005), and technology capability (Gold, Malhotra, & Segars, 2001). Second, my study is similar to Francalanci and Morabito's (2008) work investigating the link between information systems integration and absorptive capacity. However, while I conceptualize and measure absorptive capacity as an organization's ability to identify, assimilate and apply valuable external knowledge, Francalanci & Morabito view absorptive capacity as an organization's orientation toward process, training, change, and flexibility. Thus, my study is based more closely on Cohen and Levinthal's (1990) original conceptualization of absorptive capacity. Finally, I include data integration and connectedness for several reasons: 1) they are grounded in existing qualitative absorptive capacity research (Van den Bosch et al., 1999); 2) their role in the absorptive capacity nomological network is not well understood (based on empirical evidence) (Lane et al., 2006; Volberda et al., 2010); and 3) it is important for managers to understand how capabilities such as data integration and connectedness may affect their organization's knowledge absorption processes.

I now provide arguments for a relationship between data integration and absorptive capacity. Through its R&D activities, a firm develops collective knowledge about customers, markets, and technology and how those areas relate to the firm's products and services. This knowledge base enhances the firm's ability to identify and value external knowledge. However, exposure to related external knowledge is not sufficient to ensure that a firm will absorb it (Pennings & Harianto, 1992). The knowledge must be assimilated into the firm's knowledge base. While a knowledge base enables the connections needed for insights related to new knowledge, the organizational assimilation of new knowledge depends more so upon the transfer of knowledge across and within sub-units (Cohen & Levinthal, 1990). Organizations may transmit and share knowledge in many ways: formal and informal liaison structures, coordination mechanisms, autonomous R&D climates, and technological competencies (Garcia-Morales, Bolivar-Ramos, & Martin-Rojas, 2014; Huang, Lin, Wu, & Yu, 2014; Jansen et al., 2005).

The functionality provided by data integration is specifically intended to connect business processes together to facilitate information flow (McAfee, 2002). Integrated databases enhance visibility, thereby increasing the ability to assess the value of external knowledge as it relates to what the organization already knows. For example, the entry of customer feedback can flow through the entire system and be available to multiple organizational units. While one unit may not deem such feedback to be valuable, another unit could associate the feedback with a needed change in the organization's products or services. By making new knowledge visible throughout the organization, data integration increases the ability to recognize the value of such knowledge.

Data integration also allows for a consistent and "holistic" view of data elements throughout the organization, thereby facilitating the effective storage and retrieval of past activities and outcomes (Walsh & Ungson, 1991). The integration of customer, market, partner, and industry-related knowledge domains provides a robust picture of a firm's knowledge base. This affords two key benefits with regard to the assimilation of external knowledge. First, new external knowledge can be paired up to what the organization knows within a particular knowledge domain. For example, a radical change in order-related information from a key partner can be compared to information related to previous exchanges with that and other supply chain partners in order to create new knowledge (Malhotra, Gosain, & El Sawy, 2005).

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