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Absorptive capacity for need knowledge: Antecedents and effects for employee innovativeness

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ABSTRACT

Innovation occurs when knowledge about unmet customer needs intersects with knowledge about technological solutions. Both knowledge types are often located outside the firm and need to be absorbed in order for innovation to occur. While there has been extensive research into absorptive capacity for solution knowledge, a necessary complement – absorptive capacity for new customer needs – has been neglected. In an individual-level study of 864 employees from a home appliance firm, we show that need absorptive capacity is theoretically and empirically distinct from solution absorptive capacity, and that both are positively associated with employee innovativeness. Interestingly, we find asymmetric extra-domain effects: prior solution knowledge is positively related to need absorptive capacity (cross-pollination effect), while prior need knowledge is negatively related to solution absorptive capacity (attenuation effect). We contrast the cognitive underpinnings of the two absorptive capacity types, contributing to emerging scholarly thinking on the domain-specificity and micro foundations of absorptive capacity.

1. Introduction

In 1968, 3M engineer Spencer Silver developed an adhesive technology that had no application inside 3M owing to its poor adhesive power. It was “a solution waiting for a problem to solve” (Spencer Silver (3M, 2003, p. 38)). Years later, during choir rehearsals, 3M engineer Arthur Fry was frustrated to find that his bookmarks were prone to falling out of his scores. Confronted with his personal need for strong yet removable markers, he realized that Silver’s adhesive technology could solve his problem. The combination of Fry’s discovery of an unmet need and Silver’s technological solution resulted in a 3M blockbuster innovation, the Post-it note (3M, 2003).

As illustrated in this well-known example, two knowledge types are crucial for innovation: Need knowledge and solution knowledge (Alexander, 1964; von Hippel, 1994). Need knowledge refers to unmet needs arising in the use of a given product or service, while solution knowledge refers to solving technical problems and providing functionality (Alexy et al., 2013). If both knowledge types are available in an organization, and if there is sufficient fit between the two knowledge sets, they can be combined so as to produce innovation.

In contrast, if crucial need knowledge or solution knowledge is

situated outside organizational boundaries, for instance in the customer domain or in research centers (Chesbrough, 2003b; Laursen and Salter, 2006), it must be absorbed by the firm in order to be used for innovation. Thus, absorptive capacity – i.e. the capacity to identify, assimilate, and apply external knowledge for innovation – is essential for innovation in organizations (Cohen and Levinthal, 1990).

The literature focuses almost exclusively on absorptive capacity in relation to technical solution knowledge (Lane et al., 2006; Volberda et al., 2010), which we refer to as solution absorptive capacity. It has been virtually silent on absorptive capacity in relation to need knowledge, i.e. need absorptive capacity. Yet, need knowledge and solution knowledge are fundamentally different knowledge types: need knowledge is more unstructured, more uncertain, more latent, stickier, and harder to transfer than solution knowledge (Autio et al., 2013; Nickerson et al., 2007; Slater and Narver, 1998; von Hippel, 1994). Thus, absorptive capacity in both domains may well have different antecedents and transmission mechanisms. To narrow absorptive capacity to solution knowledge, and thus to the R&D context only, is problematic since it impedes exploration of how absorptive capacity operates for other knowledge types and in other contexts (Lane et al., 2001) and leads to erroneously mistaking solution absorptive capacity

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for the whole story.

We set out to investigate the antecedents and consequences of need absorptive capacity and examine how prior knowledge in a given domain (need or solution) affects absorptive capacity within and across domains. By answering these questions, we deepen our understanding of the absorptive capacity construct and respond to calls for research (Lane et al., 2006; Volberda et al., 2010) that challenge us to “be explicit about what kind of knowledge is being absorbed” (Volberda et al., 2010, p. 943).

The research has mostly analyzed absorptive capacity at the firm, business unit, or team level (e.g. Jansen et al., 2005; Lane and Lubatkin, 1998; Lane et al., 2001; Tsai, 2001); it has only more recently begun to address the sources and nature of absorptive capacity by investigating its micro-level foundations (Colombo et al., 2013; Lowik et al., 2012; Matusik and Heeley, 2005; Ter Wal et al., 2017; Tortoriello, 2014). According to Cohen and Levinthal (1990, p. 131), organizational absorptive capacity is rooted in individual absorptive capacity, and several scholars have called for more research into absorptive capacity at the individual level (Lane et al., 2006; Volberda et al., 2010). We respond to these calls and investigate how prior need and solution knowledge shape need and solution absorptive capacity, respectively, and how both absorptive capacity types shape employee innovativeness.

Using survey data from 864 employees of a large manufacturer of home appliances and independent ratings of individual innovativeness, we find that employees’ need knowledge and solution knowledge increase need absorptive capacity. In contrast, solution absorptive capacity is positively related to solution knowledge but, interestingly, is negatively related to need knowledge. In other words, solution knowledge leverages both employees’ need and solution absorptive capacity. We explain this effect by arguing that solution knowledge structures provide a schema for the absorption of new need knowledge, building on the notion of fungibility of technological knowledge for different applications (Danneels, 2007). Need knowledge, by contrast, leverages employees’ need absorptive capacity, but attenuates their solution absorptive capacity. We argue that this effect is rooted in the fact that need knowledge does not provide cognitive structures for the absorption of solution knowledge, only for the absorption of need knowledge. Since cognitive resources are limited, higher attention to need knowledge absorption inhibits solution knowledge absorption. Regarding the consequences of need absorptive capacity, we find that it positively affects innovativeness above and beyond solution absorptive capacity’s effect.

Our principal contributions are as follows: First, we advance scholarly thinking on the absorptive capacity’s domain-specificity by conceptualizing and empirically juxtaposing absorptive capacity for need and solution knowledge. We argue that need absorptive capacity is an important and to date largely under-researched complement to absorptive capacity related to technical solutions, which is the focus of the current literature. We find that need absorptive capacity is a mechanism that explains how external need knowledge is identified, assimilated, and applied for product innovation.

Second, we contribute to research into absorptive capacity by showing that prior solution knowledge is associated with increased need absorptive capacity. Referring to prior research that has dubbed the ability to invent and create new information as “the first face of R&D” and the ability to absorb technological solution knowledge “the second face of R&D” (Cohen and Levinthal, 1989), we describe the ability to recognize new needs as the third face of R&D. In contrast, we found prior need knowledge to be negatively associated with solution absorptive capacity. These results shed light on cross-domain effects of knowledge accumulation on absorptive capacity. Absorptive capacity in a given domain X can have a positive (negative) association with prior knowledge in a different domain Y – a cross-pollination (attenuation) effect that has not been studied to date. We discuss and theorize the cognitive roots of these extra-domain effects, providing a cognitive

explanation for the conditions under which extra-domain knowledge positively or negatively affects knowledge absorption in a different domain.

This adds to the nascent micro-level literature on absorptive capacity (Colombo et al., 2013; Lowik et al., 2012; Matusik and Heeley, 2005; Ter Wal et al., 2017; Tortoriello, 2014) by illuminating absorptive capacity’s cognitive underpinnings at the individual level and shedding light on the question how cognitive structures rooted in different knowledge domains shape innovation. This helps one to re-connect absorptive capacity to its individual cognitive foundations (Cohen and Levinthal, 1990) and counters the construct’s reification (Lane et al., 2006).

Third, our conceptualization of need absorptive capacity informs research into demand-driven innovations initiated outside the firm (Anderson et al., 2014; Priem et al., 2012; von Hippel, 1994). This literature emphasizes that a significant share of innovation-related activity happens outside producer organizations in the user domain (Hippel, 1988; von Hippel et al., 2012). User innovations are tied to use experience and are based on in-depth need knowledge. Many firms struggle to incorporate user ideas as they originate in a different thought world (Dougherty, 1992a). Nonetheless, to date, existing research hardly considers how firms can absorb these ideas and innovations to ultimately profit from user innovations originating outside the firm (Anderson et al., 2014; Priem et al., 2012). Our research suggests that need absorptive capacity facilitates the absorption of user-developed innovations into the producer firm.

The remainder of this paper is organized as follows: In Section 2, we describe the theoretical background and develop our research model. In Section 3, we explicate our methodology; in Section 4, we present the empirical results. In Section 5 we discuss our findings and consider theoretical contributions, limitations, and managerial implications.

2. Theoretical background and research model

2.1. Introducing need absorptive capacity

Absorptive capacity, as defined by Cohen and Levinthal (1989, 1990, 1994), is a firm’s ability “to recognize the value of new, external information, assimilate it, and apply it to commercial ends” (1990, p. 128). Thus, absorptive capacity is the mechanism that makes external knowledge available to and usable within an organization.

Absorptive capacity depends on domain-specific knowledge, which represents the raw building material of individual creativity (Amabile, 1988; Dane, 2010) and is organized in domain-specific schemas or knowledge structures (Fiske and Taylor, 2013). The most important predictor of absorptive capacity in a given domain is prior knowledge in that domain (Cohen and Levinthal, 1990); we call this intra-domain knowledge.

Although Cohen and Levinthal (1990) originally proposed absorptive capacity as a mechanism for the absorption of different knowledge types, they subsequently focused only on technological knowledge (i.e. solution knowledge). They proposed absorptive capacity as the second face of R&D (Cohen and Levinthal, 1989), i.e. the idea that prior knowledge from in-house R&D efforts is the main feed-stock for firms’ absorptive capacity. In this tradition, subsequent studies have conceptualized absorptive capacity as the ability to absorb technical knowledge and have measured absorptive capacity as R&D spending, number of patents, or number of scientists (Volberda et al., 2010). Innovations based on new technologies are clearly important and play an eminent role in shaping firm and industry evolution. Nevertheless, even if research has shown that technology push and demand pull can be equivalent sources of successful innovation (Dosi, 1982; Mowery and Rosenberg, 1979), research into absorptive capacity has mainly taken a technology-centric view.

More recently, scholars have become aware that the nature of the knowledge to be absorbed affects the absorptive capacity type that is

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