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Antecedents to ambidexterity competency in high technology organizations☆

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ABSTRACT

High tech organizations confront dual demands of exploring new products/processes and exploiting existing products/processes. Research shows that ambidextrous organizations can better manage these dual demands, but our understanding of the antecedents that lead to ambidexterity is still emerging. In addition, previous research has taken a piecemeal approach to understand ambidexterity and does not fully consider its multilevel nature. This research takes a multilevel perspective and argues that a competency in ambidexterity involves three capabilities at different organizational levels: decision risk (strategic level), structural differentiation (project level), and contextual alignment (meso level). After correcting for endogeneity we empirically examine the relationship between these antecedents and ambidexterity competency by collecting multi-level data from 34 high tech business units and 110 exploration and exploitation R&D projects. The results indicate that decision risk and contextual alignment affect ambidexterity competency for high tech organizations. Structural differentiation does not affect ambidexterity competency but has mixed effects on R&D project performance.

1. Introduction

> "To survive, organizations must execute in the present and adapt to the future. Few of them manage to do both well." – Eric D. Beinhocker (Beinhocker, 2006)

> "Tension between creativity and efficiency is bedeviling CEOs everywhere."–Interview with George Buckley, 3M Corporation

High tech organizations operate in fast industry clockspeed characterized by frequent changes in product/process technologies and increased competitive intensity (Bourgeois and Eisenhardt, 1988; Carrillo, 2005). To flourish or even survive in these environments organizations need to simultaneously explore and exploit (Adler et al., 2009; Cho and Pucik, 2005). Exploration[3] involves "activities aimed at entering new product and process domains," while exploitation involves "activities aimed at improving existing product and process positions" (He and Wong, 2004, p. 484). The organizational learning literature has extensively documented the tensions between exploration and exploitation (Levinthal and March, 1993; Benner and Tushman, 2002; He and Wong, 2004). Failure to manage these tensions can result in a success trap (too much exploitation at the expense of exploration) or a failure trap (too much exploration at the expense of exploitation) (Levinthal and March, 1993). Well known organizations such as Motorola, Ericsson, and Samsung have failed to manage these tensions in their R&D settings and lost their competitive advantage (Christensen and Raynor, 2003). For example, Motorola's cell phone division reported a third quarter (in 2008) loss of $394 million and eliminated over 3000 jobs due to their inability to simultaneously develop products for current and future cell phone markets. According to a business analyst report, the R&D labs at Nokia and Research in Motion (RIM) developed a better product mix for both the current and future markets which resulted in the decline of Motorola's market share (Holmes, 2008).

Operations Management scholars have also studied these tensions as the productivity dilemma (Adler et al., 2009; Hayes et al., 2004). Several decades of research on this topic show that an

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[3] Previous research has used radical and incremental innovation interchangeably with exploration and exploitation (see Ettlie, 1995; Gatignon et al., 2002).

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organization's focus on efficiency or exploitative gains can inhibit their ability to innovate or explore (Abernathy, 1978; Benner and Tushman, 2002; Jansen et al., 2009). In high tech organizations, exploration–exploitation tensions occur at multiple levels. For example, a R&D project team member at 3M illustrates this tension "*One minute [senior] management is telling us to innovate, and the next minute they are giving us marching orders to deploy Six Sigma and become efficient. It is crazy to tell people they should be focused on becoming more efficient while at the same time you want them to explore untapped growth potential. This is making me nuts* (Rae, 2007, p.1)." As suggested by this vignette, the senior management not only makes decisions about exploration and exploitation opportunities, but also implements and evaluates them as R&D projects. The 3M story suggests that the R&D Director used similar metrics and procedures to evaluate both exploration and exploitation R&D projects which created project team issues. This example illustrates the failure to manage exploration–exploitation tensions at both strategic and project levels can create problems. Research shows that ambidextrous organizations can overcome the productivity dilemma and can simultaneously explore and exploit (O'Reilly and Tushman, 2004; Adler et al., 2009). However, little research investigates the prior capabilities that help organizations develop a competency in ambidexterity (Raisch et al., 2009). This research investigates the following question: *What are the antecedents to competency in ambidexterity for high tech organizations?*

Following Vickery (1991), we define ambidexterity competency as the organization's ability to explore and exploit in comparison to its competitors in a similar environment. Measuring ambidexterity as a "competency" (i.e. their ability to explore and exploit) rather than "actual performance" is an important step in this research. According to McGrath et al. (1995, p. 253), the actual performance on any competency will only occur "long after the competency is developed" and deployed. They further note that when understanding precursors (antecedents), it is important to first apprehend how these antecedents affect competency before studying its impact on actual performance (Amit and Schoemaker, 1993; Van de Ven, 1986). In a recent paper Danneels (2008) studies the antecedents to the competence for exploring new markets and new technologies. Since the purpose of our research is to understand the antecedents to ambidexterity, we follow (McGrath et al. 1995; Amit and Schoemaker, 1993; Danneels, 2008) and measure ambidexterity as a competency.

This study makes the following contributions to our understanding of an ambidexterity competency in high tech organizations. First, it argues that high tech organizations benefit from three distinct capabilities (decision risk, structural differentiation, contextual alignment) at different organizational levels to develop ambidexterity competency. A decision risk capability helps senior level managers resolve the conflicting tensions that occur when making exploration and exploitation decisions. A structural differentiation capability allows exploration and exploitation projects to coexist within the same physical setting. And a contextual alignment capability at the meso level promotes alignment and adaptability across the strategic and project levels. Second, the analysis examines the antecedents to ambidexterity competency in a fast industry clockspeed where managing these tensions become more challenging. Finally, this study empirically investigates the relationship between ambidexterity competency and performance by collecting multilevel survey data from 110 R&D projects in 34 high tech business units.

The rest of the paper is organized as follows. Section 2 reviews the literature on ambidexterity. Section 3 develops hypotheses of the antecedents at different levels that lead to ambidexterity competency. Section 4 discusses the research design to collect multilevel data from 34 business units and 110 R&D projects. Section 5 gives the analysis and the results. Finally, Section 6 discusses the contributions, limitations, and directions for future research.

2. Literature review

Explanations on how organizations manage exploration–exploitation tensions can be broadly categorized into two streams: ambidexterity and punctuated equilibrium (Gupta et al., 2006). Punctuated equilibrium argues that organizations mitigate these tensions by temporally separating these activities (Victor et al., 2000; Adler et al., 2009). That is, exploration follows exploitation or vice versa. In contrast, the ambidexterity literature argues that organizations can do both of these learning activities simultaneously (Jansen et al., 2009; O'Reilly and Tushman, 2004). For high tech organizations, ambidexterity becomes more relevant since these organizations cannot temporally separate exploration and exploitation to remain competitive. In fact, recent studies find that ambidexterity leads to higher performance for high tech organizations (Auh and Menac, 2005).

Although there is general consensus about the relationship between ambidexterity and performance, few studies have looked at the antecedents that promote ambidexterity competency (Andriopoulous and Lewis, 2009; Jansen et al., 2009). Even these limited studies do not recognize the multilevel nature of ambidexterity (Jelinek and Schoonhoven, 1990). Raisch et al. (2009) conclude that research on ambidexterity often adopts a piecemeal approach and does not consider exploration–exploitation tensions that can occur across different organizational levels. For instance, one stream of research on ambidexterity studies the exploration–exploitation tensions at the operational level but treats the strategic level decisions as "unstructured and messy" (Loch and Kavadias, 2007, p.18; Loch and Kavadias, 2007, p.18; Chao et al., 2009). According to this literature, operational level tensions can be mitigated by physically separating exploration (in R&D units) and exploitation (in manufacturing) (Jansen et al., 2009). Another stream of research on ambidexterity treats the organization as the unit of analysis and does not delineate the intra-organizational capabilities that allow them to simultaneously explore and exploit (see He and Wong, 2004; Cho and Pucik, 2005). This piecemeal approach has resulted in diverse mechanisms such as integration (Smith and Tushman, 2005), differentiation (Jansen et al., 2009), and alignment and adaptability (Gibson and Birkinshaw, 2004) that can promote ambidexterity competency. It is not clear whether these are complementary or substitutable mechanisms.

A second limitation with these studies is that they do not adequately account for the role of environmental context. That is, how organizations manage exploration–exploitation tensions may depend on factors such as industry clockspeed (Fine, 1998; Carrillo, 2005). In a slow industry clockspeed environment (e.g. paper, steel), organizations can spatially separate exploration and exploitation and confine them to R&D and Manufacturing respectively (Hayes et al., 2004; O'Reilly and Tushman, 2004). However, spatial separation does not work well in fast industry clockspeed (e.g. personal computer, semiconductor) where these learning mechanisms complement one another and organizations benefit when they coexist (Jelinek and Schoonohoven, 1990; Jayanthi and Sinha, 1998). Accounting for environmental context can help better understand the antecedents needed to develop ambidexterity competency.

To summarize, not fully considering environmental context and adopting a piecemeal approach has limited our understanding of the antecedents to ambidexterity competency. This study addresses these concerns by restricting the research scope to high tech organizations and adopting a multilevel theoretical lens. We