The role of IT application orchestration capability in improving agility and performance

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ABSTRACT

This paper investigates how IT application orchestration – a dynamic capability encapsulating a firm's ability to refresh its application portfolio through a process of building, buying, and retiring IT applications – impacts firm performance. We propose a conceptual model in which the effect of IT application orchestration on firm performance is mediated by process agility. We further propose that a firm's strategic orientation moderates the effect of IT application orchestration capability on process agility. Analysis of data from an international survey of IT executives supports our proposed hypotheses. This research contributes to the emergent literature on dynamic capabilities by proposing and testing a theory of how IT application orchestration capability affects agility and firm performance.

1. Introduction

In the first decade of the new millennium, the relationship between information technology (IT) and process agility has emerged as a key area of interest for IT executives (Luftman et al., 2013; Roberts and Grover, 2012).1 In response, academics have begun to explore the effects of IT resources and capabilities on process agility (agility, for brevity) and the resulting implications for firm performance (Chen et al., 2014; Tallon and Pinsonneault, 2011). The link between agility – defined as “the ability to detect and respond to opportunities and threats with ease, speed, and dexterity” (Tallon and Pinsonneault, 2011, p. 464) – and firm performance underlines the need for businesses to adapt quickly to new market conditions and the risks from failing to react in time (Chakravarty et al., 2013; Ravichandran, 2017; Sambamurthy et al., 2003). Calls for IT-based responses to market change require that IT resources be continuously and quickly updated (Vessey and Ward 2013; Weill et al., 2002). This might involve retiring legacy systems that impede agility or extending the IT portfolio with new agility-enabling applications (Boh and Yellin, 2007; Clark et al., 1997). This, in turn, triggers discussions on the type of capabilities required to manage an evolving IT portfolio and whether firms should build or buy IT (Leiblein et al., 2002; Rai et al., 2015). While research shows that IT can improve agility (Chen et al., 2014; Roberts and Grover, 2012), the literature is relatively silent on how firms should manage their IT resources to deliver greater agility, the capabilities needed to do this, and the resulting implications for firm performance.

Studies show that a wide variety of IT-related capabilities, including information management capabilities, IT infrastructure capabilities, and planning capabilities, generate performance benefits for firms (Lu and Ramamurthy, 2011; Mithas et al., 2011; http://dx.doi.org/10.1016/j.jsis.2017.10.002

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1 Since the great recession in 2008, agility has been repeatedly ranked as a top ten concern for IT executives (Luftman et al., 2013).


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Pavlov and El Sawy, 2011; Rai et al., 2006; Rai and Tang, 2010). Studies also show that agility is an important mechanism through which IT capabilities affect firm performance (Chen et al., 2014; Ravichandran, 2017). Despite significant advances in that literature, the focus of prior studies has been primarily on IT infrastructure and planning. In contrast, less attention has been paid to IT applications-related capabilities and how firms generate benefits from their IT application portfolios (Nazir and Pinsonneault, 2012). While IT infrastructure is becoming more of a commodity (Bhatt and Grover, 2005), firms are increasingly investing in applications such as analytics and business intelligence, business process management, and intrafirm collaborative systems in the hope of increasing agility and performance (Kappelman et al., 2016; Luftman et al., 2012, 2013; Nazir and Pinsonneault, 2012). However, we know little about whether and how a firm’s capacity to update its IT applications portfolio affects agility and how agility, in turn, affects firm performance.

This study extends prior research by investigating the effects on agility and performance of a firm’s ability to renew its portfolio of IT applications. We refer to this capability as IT application orchestration. Teece (2007) posits that the ability to renew a portfolio of resources is an important orchestration capability that can generate significant benefits for firms. Sirmon et al. (2007, 2011) further explain that resources tend to lose their value rapidly because of market changes and, therefore, firms need to continuously and quickly add new resources to their portfolios (i.e., purchase and develop new resources while divesting less-valuable ones). Like any other portfolio of resources, the IT applications portfolio must be continuously updated; firms do so by purchasing new applications, building applications, and discontinuing those that are no longer relevant. Hence, we define IT application orchestration capability as the ability of firms to renew the IT applications portfolio through developing IT applications, purchasing IT applications, and discontinuing less-relevant ones. Drawing on the above literature and prior studies on IT capabilities, we build and test a model of how IT application orchestration capability affects agility and firm performance.

This paper contributes to the literature in two respects. First, we show that IT application orchestration capability generates performance benefits and that agility is a key mechanism through which these benefits occur. Second, we show that strategic orientation moderates the effects of IT application orchestration capability on agility. Specifically, the effects of IT application orchestration capability on agility are stronger in firms pursuing a strategy of differentiation rather than operational excellence. We assessed these relationships at the business unit level within a broader firm context and so our findings must be interpreted in that more restrictive domain.

The rest of this paper is organized as follows. The next section discusses prior literature on IT capability and orchestration capability and develops our hypotheses. Then, we outline the data collection approach, the measures employed in this study, and the analysis conducted on the empirical data. The subsequent section presents the study results. Finally, we evaluate the results, analyze research limitations, and discuss the implications of the research for theory and practice.

2. Theoretical background

2.1. Prior research on IT capability and orchestration dynamic capability

IT capability refers to an organization’s “ability to mobilize and deploy IT-based resources in combination or copresent with other resources and capabilities” (Bharadwaj 2000, p. 171). Prior literature investigates various dimensions of IT capability. For instance, Weill and Vitale (2002) and Weill et al. (2002) examine IT infrastructure capability and infrastructure services, including security and risk management, communication, data management, application infrastructure, IT facilities management, and IT architecture and standards; Bharadwaj (2000) focuses on human IT resources, IT infrastructure, and IT-enabled intangibles; Fink and Neumann (2007) investigate IT personal and IT infrastructure capabilities; and Wang et al. (2012) examine IT planning and use. The empirical evidence in this body of literature shows that IT capabilities are important enablers of firm performance. A summary of the literature examining the performance impacts of IT capabilities is provided in Appendix A.

A number of studies have argued that the primary effects of IT occur at the process-level and that those effects may aggregate to the firm-level (Barua et al., 1995; Melville et al., 2004; Mithas et al., 2011; Setia et al., 2008; Tallon 2008). This suggests that process-level impacts of IT are important for understanding how IT capabilities relate to firm performance. For example, Ray et al. (2005) and Setia et al. (2013) show that IT capabilities affect business process performance. Fink and Neumann (2007), Lu and Ramamurthy (2011), and Chen et al. (2014) show that IT capabilities enhance process agility which, in turn, affects firm performance (Chen et al., 2014; Tallon and Pinsonneault 2011).

Consistent with the argument that the primary effects of IT occur at the process-level, Pavlov and El Sawy (2006, 2011) investigate the impacts of IT capabilities on the new product development (NPD) process. They show that competitive advantage in NPD depends on IT-enabled dynamic capabilities and functional competencies. This is an important area of research for understanding the performance impacts of IT because, while a number of studies investigate IT functional competences (e.g., Bharadwaj, 2000; Chae et al., 2014; Chen et al., 2014; Fink and Neumann, 2007; Wang et al., 2012; Weill et al., 2002), less attention has been paid to IT-enabled dynamic capabilities that are more likely to enable differentiation strategies (Koch, 2010; Pavlov and El Sawy, 2011; Roberts and Grover, 2012). For instance, we know little about how IT-enabled dynamic capabilities impact process-level outcomes such as process agility.

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2 This is often described in the strategic management literature as “asset orchestration” (Teece, 2007). We use the term “resources” instead of “assets” to be consistent with IS research that defines IT capability in terms of resources (Bharadwaj, 2000) and that defines resources as profit-producing assets (Drnevich and Croson, 2013).
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