Business analytics use in CRM: A nomological net from IT competence to CRM performance

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ABSTRACT

Business analytics (BA) becomes increasingly important under rapidly changing business environment. A research challenge is that BA use is not fully understood. We tackle this challenge from the perspective of dynamic capability by using an empirical model with the emphasis on BA use in customer relationship management (CRM). Based on 170 samples from firm-level survey, we analyze the nomological linkage from IT competence to CRM performance. The results show data management capability fully mediates between IT competence and BA use, while customer response capability partially mediates between BA use and CRM performance.

1. Introduction

Contemporary organizations have adopted business analytics (BA) to gain competitive advantage under rapidly changing business environment (Goes, 2014; McAfee & Brynjolfsson, 2012; Popovič, Hackney, Tassabehji, & Castelli, 2016). BA enables firms not only to better understand internal business processes through data-driven decision making but also to sense market opportunities and threats by strengthening customer relationship management (Kiron, 2013). BA continues to be a top priority for a number of organizations and the promise of BA is attracting many followers (Işık, Jones, & Sidorova, 2013; Verhoef, Kooge, & Walk, 2016). Although BA is one of the most essential technologies to sharpen innovation (Chen, Chiang, & Storey, 2012), considerable number of BA implementations have failed and the adopters still struggle to obtain the suitable benefits (Işık et al., 2013; Ransbotham, Kiron, & Prentice, 2016; Schick, Frolick, & Ariyachandra, 2011). However, the reasons of the failures of BA adoption have not been fully explored in the literature.

From the resource based view, previous scholars have noted the impact of information technology (IT) competence on competitive advantage (Mata, Fuerst, & Barney, 1995), business value (Bharadwaj, 2000) and business performance (Lioukas, Reuer, & Zollo, 2016). Since BA is an IT-enabled technology, business analytics capability has been also considered a driver of business performance (Akter, Wamba, Gunasekaran, Dubey, & Childe, 2016; Wamba et al., 2017). However, technology competence per se does not always affect the performance. IT alone does not enhance organizational performance clearly (El Sawy, Malhotra, Park, & Pavlou, 2010). IT business value is determined by the extent of IT usage in business activities (Zhu & Kraemer, 2005) and depends on a firm's abilities to leverage IT than IT itself (Clemons & Row, 1991; Ross, Beath, & Goodhue, 1996). Applying the findings of prior studies on IT to BA, we focused on the use of BA rather than BA itself or capability.

Analytics has been actively invested and widely adopted to support customer relationship management (CRM) technology (i.e. acquire and retain customers). CRM vendors and practitioners believe that BA-enabled CRM capability, an ability to analyze, integrate, and leverage information resources and customer feedback for decision-making support in CRM, will improve business value and are active in introducing BA systems with advanced statistical modeling, simulation, forecasting and machine learning (Coltman, 2007; Coltman, Devinney, & Midgley, 2011; Shanks & Bekmamedova, 2012). However, the results of the use of CRM technology are debatable (e.g., Reinartz, Krafft, & Hoyer, 2004), and there has been little research on the BA use to improve CRM performance. Since CRM is traditionally the basis of data analysis and is now being transformed into big data- or business analytics-based, it is necessary to study a series of processes that generate business value and the result can be a guide for BA use and application to practitioners. Thus, this study attempts to explore the nomological net by focusing on BA use in driving business value from IT competence in the context of CRM.

Dynamic capability perspective can provide a theoretical lens for linking BA use and CRM performance drawn from IT competence. Since this view explains how organizations integrate, reorganize, and renew IT resources in order to response to rapidly changing customer needs and market environments (Eisenhardt & Martin, 2000; Pavlou & El

Sawy, 2006; Teece, Pisano, & Shuen, 1997), previous studies have considered dynamic capability as a theoretical basis for BA research on supply chain (Chae & Olson, 2013), as a foundation of big data analytics capability model (Wamba et al., 2017), and as the mediators on BA-related variables and performance (e.g., Cao, Duan, & Li, 2015; Wang & Byrd, 2017). This study conceptualizes a firm's data management capability and customer response capability as BA-related dynamic capabilities that play a mediating role between IT competence to CRM performance. The capability of data management is necessary for BA since today's data sources go beyond the structure data and includes a ton of unstructured data generated across the value chain (Prahalad & Krishnan, 2008). Despite its importance for business analytics, information scholars have focused on IT competence itself and have less addressed data management capability. Moreover, organizations have used the technology to enhance customer relationship and analyze customer behavior (Jayachandran, Sharma, Kaufman, & Raman, 2005; Ling & Yen, 2001), since firms need to response quickly to changes in customer needs (Day, 1994). Thus, firms should cultivate dynamic capability before and after the use of BA to manage data and respond to customer needs effectively for making better performance. By considering data management capability and customer response capability as important dynamic capabilities of a firm and attempting to identify their roles in BA use, this study seeks to shed more light on dynamic capabilities that can leverage BA that leads to better CRM performance from IT competence.

This study is meaningful in information systems (IS) literature. We develop a parsimonious model by examining the antecedents and consequences of BA use. We collect data from firm-level survey and 170 samples are used to test our research model. By exploring the relationship around BA use, we discover the missing links from IT competence to business performance through BA use. From the dynamic capability perspective, we enhance the understanding of nomological net from IT competence to CRM performance by defining customer response capability and data management capability. This study can be a stepping stone to future studies on BA use in CRM and dynamic capability.

2. Theoretical background: dynamic capability

Dynamic capability is "a firm's ability to integrate, build, and re-configure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p. 516). Strategic management literature has suggested that resource based view conceptualizes a firm as a bundle of resources that creates business value by combining heterogeneous resources if underlying resources are economically valuable, difficult to imitate, or imperfectly mobile (Barney, 1991; Bharadwaj, 2000). The rapidly changing environment makes unrealistic the presumption that relocation of resources is difficult. Since firms continually reconfigure their existing resources and capabilities, the recent dynamic business environment come to highlight the dynamic capabilities to integrate and reconstruct the enterprise resources (Eisenhardt & Martin, 2000).

Strategic management scholars have studied a variety of organizational dynamic capabilities. For instance, Helfat (1997) regarded R&D as dynamic capability to develop new products and processes in response to changes in market prices. Karim and Mitchell (2000) considered acquisition process as a dynamic capability that plays a crucial role in business reconfiguration, offering opportunities to build on extant resources and obtain different resources. Modularity in organizational structure can also be a dynamic capability (Karim, 2006). By reshuffling business unit, a firm can recombine and adopt resources in keeping with the change in environment.

IS field has also paid particular attention to dynamic capability. Wade and Hulland (2004) suggested that although IT may not be able to directly create a competitive advantage, it helps to develop, add, and integrate principal resources and plays an important role in bringing

about a long-term competitive edge in an unstable environment. Pavlou and El Sawy (2006) found that IT leveraging competence has actually no direct influence on competitive advantage, but dynamic capabilities act as mediator in the process. In case of BA, scholars have considered BA as a dynamic capability to enhance firm performance directly (Akter et al., 2016) or as an enabler of performance mediated by dynamic capability such as absorptive capacity (Wamba et al., 2017; Wang & Byrd, 2017). Maklan and Knox (2009) strengthened the critical role of dynamic capability by pointing out that the reason of the return on investment for CRM below expectations is that the investment in CRM had been too much concentrated on resources such as databases, web sites, analytical tools, and call center, while investment in dynamic capabilities that could select, develop, and deploy the CRM resources had not been sufficient.

In this study, we define the data management capability and customer response capability as major dynamic capabilities for BA use in CRM. Data management capability consists of the ability to enhance data quality and integrate data from various sources in order to provide qualified and integrated data for further analysis. Even if a company has lots of data, it takes a lot of time and effort to rework and integrate data and the analytics results cannot be trusted when data quality is low. Due to the deterioration in data quality, costs for product-related rework are all on the rise (Russom, 2006). In fact, data analysis teams spend 90 percent of their time on data manipulation, cleansing, and integration prior to analysis and modeling (Vidgen, Shaw, & Grant, 2017). While incremental dynamic capabilities are related with continuous improvement with no change in the base of resources of the enterprise, renewing dynamic capabilities transform or manufacture the resources (Ambrosini & Bowman, 2009). Data quality enhancement can be considered as incremental dynamic capability since it involves no special change in the base of resources, but data integration is a renewing dynamic capability because this capability reconfigures new data set by integrating heterogeneous data sources.

Even though it is necessary to response to changing customer needs quickly for organizations (Day, 1994), it becomes more difficult to grasp customer needs as they become more diversified and complex. Organizations thus harness information processes and technology use for their customer relationship (Jayachandran et al., 2005) and use BA to capture customer insights to enhance frontline employee-customer interaction (Lam, Sleep, Hennig-Thurau, Sridhar, & Saboo, 2017). CRM requires analytic methods like data mining to leverage customer-related data by analyzing hidden patterns in customer behavior (Ling & Yen, 2001), and it leads to customer response capability that refers to the ability to satisfy customer needs through effective and quick response (Jayachandran et al., 2005). It is also a dimension of the customer agility, a crucial capability for hypercompetitive environments, which is an ability to sense and respond to customer needs as an important dynamic capability because it enables firms to shape opportunities and threats, respond to market opportunities, and maintain competitiveness through reconfiguring the firm's tangible and intangible resources (Roberts & Grover, 2012).

3. Research model and hypotheses

3.1. Research model

We develop a research model to examine the antecedents and consequences of BA use for CRM as shown in Fig. 1. We explore the links from IT competence to CRM performance through BA use from the perspective of dynamic capabilities including data management capability and customer response capability.

3.2. BA use for CRM

Analytics is "the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based